

FRIDAY, OCT. 13, 1893.

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Contributions.

Bridge Accidents on the Boston & Albany.

NEW YORK, Oct. 7, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The acknowledged cause of the bridge accident on the Boston & Albany at Chester has brought to my mind a similar affair on the same road at Pittsfield, Mass., in the year 1859. About forty rods south of the station both the Boston & Albany and Housatonic railroads cross the Housatonic River by bridges parallel with each other. A new Howe truss bridge had recently been completed by the Boston & Albany at this point. After being in use a few weeks it was deemed necessary to tighten up the bolts in the structure and a gang of carpenters was sent out to do the work. If my memory is not at fault, Mr. Watson was foreman in charge. The men were distributed about the structure, engaged in the work of taking up the slack. Four or five carloads of lime and pig iron had been transferred from the Housatonic to the Boston & Albany the same day. While the mechanics were working on the bridge, these cars were backed down on the track on the east side of the structure, which collapsed, and the entire wreck fell into the stream. The men were carried with the falling timbers, but were not seriously injured. No lives having been lost there was no public investigation of the affair, and the event is of interest now as showing that the same company had previously suffered this loss of property from the lack of supervision in the case of bridge repairs. This experience brings forward again the necessity of more intelligent and thorough inspection of all structures, both public and private, by competent and trained men whose duties should be strictly confined to work of this character. No doubt it would be considered a "soft snap" and just for this reason family favorites or incompetent men, serving for small pay, are unfortunately likely to be selected for the duty. WAINWRIGHT.

English Railroad Rates.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see that an anonymous correspondent of the *Railroad Gazette* tells tales of English railway managers being pressed before a Parliamentary committee to explain why they charge more for carrying English farm produce between two stations 20 miles apart than they charge for carrying foreign produce 200 miles. He adds, and hence my reason for troubling you, "Mr. Acworth wisely avoids this question when he writes to the *Railroad Gazette* in defense of the roads."

Now, I am not aware that I have written to the *Railroad Gazette* in defense of the English roads. It would surely be absurd for me to do so. As far as principles of tarification go, the *Railroad Gazette* and its readers are, I imagine, in complete accord with the English railway managers already. Whether the English managers correctly apply these principles in individual instances must be a matter of supreme unconcern to persons 3,000 miles away. Nor have I ever constituted myself in any other publication the universal apologist for the English companies. No one is more convinced than I am that all of them are faulty—some of them very faulty indeed. But because right principles of rate fixing are sometimes wrongly applied in practice, that is, as I conceive, no reason why one should refrain from pointing out that the principles are right all the time. The important thing in England at the present moment—I imagine it is much the same in America—is that the railways shall be, broadly speaking, let alone. If they were to get into the hands of the "postal-principle" cranks, of the "equal mileage" faddists, or the gentlemen who pass unanimous resolutions in favor of one-man tribunals, with absolute power to fix "reasonable rates," it would be a disastrous thing for the country. Surely, in arguing a broad general question like this, one may be

allowed to ignore petty questions as to whether a particular rate, or group or class of rates, is or is not justifiable, without being exposed to the charge of being a mere blind advocate of existing railway management.

But perhaps I shall do more to set myself right with your correspondent if I say that when he can produce chapter and verse for his statement that rates are higher for 20 miles than for 200, I will join with him in reprobating in the strongest terms the conduct of the company responsible. Till he does produce the particulars, however, I hope he will forgive me if I say that the agricultural traffic conveyed at such rates must, I think, have consisted of a cock and a bull.

W. M. ACWORTH.

Exhibit of the Pennsylvania Railroad at Chicago.

BY JOHN C. TRAUTWINE, JR., C. E.

In planning the World's Fair exhibit of the Pennsylvania Railroad Company, Mr. Theo. N. Ely, Chief of Motive Power, and his assistant, Mr. J. Elfreth Watkins, now in charge of the exhibit, have aimed to accomplish a departure from the stereotyped display of locomotives and cars which usually go to make up the display of a railroad company, and to present instead a great object lesson in the history and in the present practice of railroad construction, as illustrated by the giant corporation which they represent. How admirably they have succeeded in this is patent to everyone who has had the good fortune to visit the company's exhibit, and it is only to be regretted that the *Railroad Gazette* cannot take space to describe with greater fullness this remarkable collection.

The headquarters of the Pennsylvania Railroad Company's exhibit are in a beautiful little building, which stands just east of the Sixty-fourth street entrance and south of the Annex of the Transportation Building. The building is white in color and cruciform in plan, having nave, aisles and transept. The main entrance is in the north transept, a roofed platform extends along the south side, and at each end of the nave is a semi-circular apse. Notwithstanding its elaborate architecture the building is intended to represent, so far as its ground plan and general arrangements are concerned, a passenger station. Immediately to the south of it is a 300-ft. stretch of four-track roadbed, and on the farther side of this is another roofed platform. The roofs of both platforms are supported by Ionic columns. Above the farther platform rises a signal tower, from which is operated a set of signals erected in order to illustrate the Westinghouse electro-pneumatic system of the Union Switch & Signal Co., which is now largely in use by the railroad company.

One of the two semicircular apses are the passenger and ticket offices and the Bureau of Information, under charge of Mr. Thomas Purdy, Chief of Bureau of Information, and in the other offices of Mr. Watkins.

In front of the building stands one of the company's "standard" cabs, with horse (of wood) but without driver. So natural is the appearance of this portion of the exhibit that many visitors, like the writer, at first supposed the horse to be as genuine as the vehicle.

The building contains an extremely valuable collection of objects, of the greatest and most varied interest.

Under the central dome, at the intersection of the nave and transept, are three relief models representing respectively the mountain region west of Altoona, with the old Portage lines and the company's present line crossing the Alleghenies, the horseshoe curve, and the old Portage plane No. 1. Near by stands a large and handsome model of one of the company's New York and New Jersey ferry-boats with screw at each end, and one representing a tug with a lighter carrying 10 freight cars. In striking contrast with the model of the modern ferry-boat is a drawing of the old ferry-boat, worked by horse power, used 65 years ago on the Delaware River between Philadelphia and Camden. The drawing was made by writer's father in 1828, when 18 years old, at the request of his employer, the late Wm. Strickland, for exhibition to Jesse Hartley, of the Liverpool docks, who was at that time visiting this country.

Just outside the door of Mr. Watkins' office stand five life-size figures representing respectively a "standard" Conductor, Brakeman, Baggage-Master, Porter and Ferry-boat Pilot, each armed, like the saints in medieval paintings, with his characteristic weapon or the instrument of his martyrdom.

A large chart of the Pennsylvania system shows the positions of all the engines of the system at 6 o'clock p. m. on Columbus Day, Oct. 21, 1892, at which time no less than 850 locomotives (exclusive of switching engines) were moving upon these lines.

A highly interesting feature of the exhibit is a series of models illustrating notable facts connected with the statistics of the company's operations. A large globe, with figures of a locomotive, a passenger and a freight car, respectively, moving around it by clockwork, impresses the lesson of the enormous passenger, freight and locomotive mileage handled by the company. A pair of rail sections, their tops covered with silver dollars, laid touching, illustrates the fact that the capitalized value of the road and its equipment is equal to the face value of the silver dollars required to cover all of the rails of the system. A small square pyramid represents the great pyramid of Cheops, while another having the same base but a dozen times the height, represents the amount of ballast upon the company's lines. A small globe, encircled by a rep-

resentation of a line of rail which overlaps considerably where it meets, inculcates the fact that the company's lines would reach around the earth and have a comfortable balance to spare. Other models indicate the amounts of water and oil consumed on the company's lines, etc., as, for instance, the fact that the company consumes as much water as would be required by Naples or Boston or San Francisco, allowing 50 gallons per head per day.

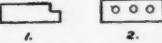
To the reflective mind there is, perhaps, nothing in the exhibit more striking than a large shield, in the form of a keystone, containing copies of the seals of the 218 railroad corporations which have been absorbed by the Pennsylvania. In the days when the "John Bull" was tossing upon the ocean on her perilous way to these shores, how many of our forefathers would have listened with patience to a suggestion that in a trifle over 60 years there would be as many as 218 railroads on the American continent, and how much less would they have been prepared for the assertion that so many lines were to be absorbed in one vast system.

In this connection we may stop for a moment to notice one of the smaller objects in the collection, a little check handed over by the Pennsylvania Railroad Company to the Philadelphia, Wilmington & Baltimore one day in 1881 in payment for the property and franchise of the latter. This check, despite its trifling dimensions, covered the considerable sum of \$14,949,052.20.

The columns within the building have attached to them hinged frames containing a remarkably valuable and interesting collection of photographs, lithographs, printed and written documents, etc.

Perhaps the most interesting of the very valuable exhibits in these frames is a series of written documents, wisely placed in close proximity, which throw light upon the question of the title of Robert L. Stevens to the invention of the T-rail, a form commonly credited by British engineers to Vignoles and generally called by his name on the other side of the water.

First, there is an invoice from Guest, Lewis & Co. to the Camden & Amboy Railroad & Transportation Co., dated Liverpool, March 3, 1831, on which appear several lots of rail of different forms, the sections being designated by numbers and also by rude sketches made by



2.



5.

nearly flat rail, No. 2 is a

countersunk rail, while No. 5 is shown on its side, the clerk evidently being unaccustomed to this form and assuming that it was to be laid horizontally, like No. 1. Near this invoice is a bill of £20, bearing the same date, from Guest, Lewis & Co. to the Camden & Amboy company, "For turning rolls for No. 5 pattern as per agreement," confirming a venerable tradition of the Stevens family to the effect that the mill declined to take the risk of rolling this unusual form with its thin web without charging a special fee as indemnity. Near this bill, again, is a letter from Francis B. Ogden, Mr. Stevens' agent, dated Liverpool, March 31, 1831, to his principal, in which he writes: "I have written to Guest & Co. to have as much of ready at Cardiff as he can by the 10th of April when I will go down to inspect it"; while in another letter to Mr. Stevens, dated Liverpool, July 16, 1831, Mr. Ogden writes: "The price of iron remains about the same as when you were here, and I do not think there would be much difference in any future contract; it would make considerable, however, if you would consent to have the rails of unequal length, say from 10 to 16 ft., and it appears to me to be of but little importance that the joints should always be opposite to each other. Vignoles has laid down his road in that way; the rails remarkably well executed on your pattern, like the piece I sent out to you; but made lighter, and is very much pleased with it and says it is decidedly the best rail in use."

In the same frame is an account of payments by Ogden, on account of the Camden & Amboy Railroad & Transportation Company, on which figures the old "John Bull" engine, charged at £784 7s. 9d., and close by is the bill of lading, dated May 14, 1831, for its shipment by "the good ship or vessel called the Allegheny," which we are enabled to reproduce. The old "John Bull," with its little old train of two cars, stands just outside of the building, while a model of both in their still earlier estate is preserved within the room.

The photographs exhibited in these frames illustrate not only the company's fixed and rolling plant, but the scenery, cities and towns, and some of the great manufacturing establishments, along the route. Here, too, the results of the Pittsburgh riots and of the Johnstown flood are shown in all their ghastliness.

A great and invaluable collection of models and relics is contained in a series of glass cases which line the north and south walls of the room. Of these a number are devoted to the illustration of the earlier history of the development of the road, from the days of the old Conestoga wagon, taking twenty days from Philadelphia to Pittsburgh, down to about 1850. Here also are models of switches and of signaling apparatus, including the system of signals used on the old New Castle & Frenchtown Railroad in the early thirties and described in the *Railroad Gazette* of Aug. 18, 1893. In striking contrast with this is the outdoor exhibit of the company's electro-pneumatic signaling system, constructed under the Westinghouse patents by the Union Switch & Signal Co.

An interesting model showing latter-day practice is that illustrating the lap-sidings in use on the single-track portions of the company's lines west of Pittsburgh,

Shipped, in good Order and Condition, by *François Rogers*
 to and upon the good Ship or Vessel called The *Assiniboine* -
Anthony Michaelis - Master, for this present voyage, now lying
 to the PORT of LIVERPOOL, and bound for *Theassaphine* -
 One Steamship Train Engine as follows.
 One Engine Boat, twice as large as the ship's boat.
 Two pair Large Woods and Axles of
 Three Boxes
 One Iron Box } Main deck.
 Being marked and numbered as per Margin, and are to be delivered, in the like good Order and Condition,
 at the aforesaid Port of *Theassaphine*
 tall and every the dangers and accidents of the Seas and Navigation, of whatever nature or kind, excepted
 onto *Steamer Custer* Esq., for the *Canadian & South-Western R. R.* Head Office, &c.
 or to their Assigns, he or they paying Freight for the said Goods.

Nineteen hundred Thirteen

Sub Primage and Average accustomed. In Witness whereof, the Master or Purser of the said Ship or Vessel hath affirmed to receive Bills of Lading, all of this tenor and date: one of which being accomplished,
the rest to stand void.—Dated in LIVERPOOL, this 16th Day of August 1893.

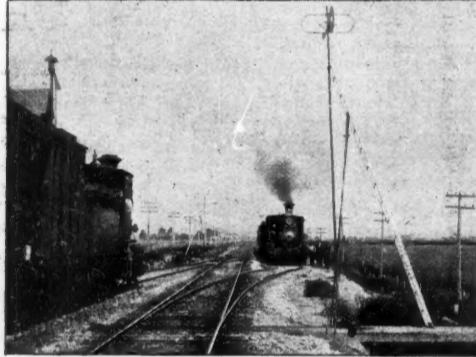
Contents unknown to

Anthony Michaelis

Bill of Lading of the "John Bull."

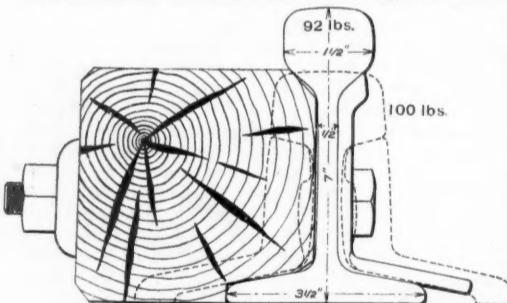
by means of which trains, headed in both directions and waiting upon the sidings, may proceed at once upon their respective ways immediately after the passage of a train upon the main line, and without waiting upon each other's movements. (See *Railroad Gazette*, pp. 630 and 888, 1890, and 367, 1893.)

One very interesting relic from the Camden & Amboy Railroad consists of two short lengths of 92-lb. rail, laid upon that road in 1848. This rail, heavier than any now in common use, is shown in the engraving. It is 7 in.



Lap Sidings—Pennsylvania Lines.

high, with $3\frac{1}{2}$ in. flange, head $2\frac{1}{4} \times 1\frac{1}{2}$ in., and web $\frac{1}{2}$ in. thick by 4 in. high. The joint consists of a three-bolt angle bar, 7 in. long on one side, and a wooden block on the other, the bolts passing through angle bar, rail and wooden block. It is a significant fact that the first angle bar that reached the Patent Office did not make its appearance until some twenty years later. It is said that but three miles of these rails were rolled, and but one



Rail and Fastenings from the Camden & Amboy.
 Full lines, Camden & Amboy, 92-lb., 1818; dotted lines, Pennsylvania Railroad "Standard," 100-lb., 1893.

mile laid. It was condemned as being too rigid, and the rails were afterward used as beams in buildings. In contrast with this rail and splice are shown, in the exhibit and in the engraving, a section of the company's "standard 100-lb. rail" and of the accompanying angle splice.

The bit of four-track road exhibited is laid with 100 lb. rails, which, for some reason, have been rolled 100 ft. long. The two inner lines, representing the freight tracks, are connected by a cross-over, the switches and signals for which are worked by the electro-pneumatic system already referred to. The rails are laid upon oak ties in stone ballast.

Outside are exhibited also the two large and specially constructed gun-cars which brought the two heaviest Krupp guns to Chicago, and which were described and illustrated in the *Railroad Gazette*, p. 299, 1893.

The tracks are crossed by a wrought iron foot-bridge, painted white to correspond with the other structures, the tunnel usually employed by the company to enable passengers to cross the tracks in safety having been found impracticable here, owing to water in the ground. A small model of the tunnel or subway is, however, exhibited within the building.

A booth in the annex of the Transportation Building contains a series of specimens illustrating the work of the company's Department of Chemical and Physical Tests, with headquarters at Altoona. Here are car wheels and an axle, showing the tests applied to those articles, and a large number of tested samples. There is also a collection of standard materials, including lubricants, fuels, telegraph materials, etc.

Closely adjoining this are four of the company's standard cars, a vestibule day coach, a refrigerator car, a track indicator car and a track inspection car. The day coach is arranged with apparatus for heating by means of steam from the engine, and illustrates the company's new standard pattern. The refrigerator car has one end removable so as to show the arrangements for storing the ice and for providing a circulation of air.

The exhibit, as a whole, is a most valuable object lesson in the art and in the history of railroading, and reflects the highest credit upon the liberality and enterprise of the company making it, upon the industry and intelligence of those who have planned it and made it an accomplished fact, and upon the public spirit of those numerous gentlemen in the service of the company who have so generously contributed relics in their private possession to make the exhibit what it is. It will be in the highest degree unfortunate if arrangements are not made for its continuance in permanent form.

Location of the Pacific Extension of the Great Northern.*

By E. H. BECKLER, C. E., formerly Chief Engineer
 Pacific Extension, Great Northern Railway.

The following paper is a synopsis of two talks on the location of the above mentioned line, explained by maps and profiles showing the various routes examined, and setting forth the numerous features which led to the adoption of the route as constructed. Books have been written which cover only the work of a few individuals for a short period. This work of the extension of the Great Northern Railway has taken the attention of more than fifty educated men for three years, with an army of followers, and a full description of their operations would fill a good sized volume. . . . The position of the existing line between Fort Assiniboine, on Milk River, and the terminus of the Montana Central at Butte, made it possible for the extension to start off at one of several points, depending upon what was to be found beyond.

It was apparent that the crossing of the Rocky Mountains could be made at the head waters of the Marais, departing from the present line near Assiniboine; or at the heads of Sun River, leaving present line at Great Falls; or at the head of Dearborn River, departing from present line at the junction of the Dearborn and Missouri rivers; or by extending westward from Butte. It was possible to drop out of consideration the line from Great Falls and the extension from Butte by reconnoissance, without actual survey, leaving only the Assiniboine and Dearborn lines to be compared by careful detail work in running lines.

These reconnaissances showed that a line by the North Fork of the Sun River led to the Flatland Valley, to the same field occupied by the Assiniboine line, with a much greater distance and with few off-setting advantages. The South Fork of Sun River led to the Dearborn outlet, with a loss as to grades and no gain in distance. The Butte line crossing mountains all the way west from Helena to the foot of the western slope of the Bitter Root Range, on the Clearwater River, has four summits with an elevation greater than 5,000 ft. and with nearly 300 miles of distance above the elevation of 4,500 ft. It was too near the region of perpetual snow to be desirable. The several mountain grades of 2.2 per cent. not found on the other lines, and the increased mileage, more than offset the advantages, although the latter were very important.

Referring now to the other two lines, the Assiniboine and the Dearborn routes, these lines come to a common point at the city of Spokane, and our comparisons will extend only that far for the present.

The Assiniboine line traverses the plateaus north of the Marais River, called Lonesome Prairie, crosses the summit of the Rocky Mountains through Marais Pass, descends to Flathead Valley by the middle fork of the river of the same name, climbs over the Kootenai Range to the Kootenai River by way of Fisher River, follows the Kootenai to Bonner's Ferry in Idaho, where the river turns northward then passes through a wide gap in the Cabinet Range to the Pend d'Oreille River, which it follows to the east line of the State of Washington (where the river also turns northward) and then

* Extracts from a paper read Feb. 11 and March 11, 1893, before the Montana Society of Civil Engineers.

swings southward going down the Little Spokane River to the vicinity of Spokane.

The Dearborn line crosses the Rocky Mountains at Roger's Pass four miles south of Cadotte Pass, spoken of in the Government reports, goes down the Big Blackfoot to Missoula and down Missoula River to the St. Regis de Borgia River, climbs the Bitter Root Range by the way of this stream to the Sohon Pass described in Captain Mullen's report on military roads in 1863, thence down the Cœur d'Alene River to Mission, thence over a divide via Fourth of July cañon to Fort Sherman, and thence across the plateau to Spokane.

Taking up now the points for comparison on these lines. The Dearborn route used about 150 miles of the already constructed line to Helena and Butte, about 100 miles of which runs through what has been up to the present time unproductive country. A stretch of about 150 miles of similar country is found on the Assiniboine line, so that train service for a freight division is required for the northern line, in excess of what would have been needed for the Dearborn route.

For the second point relative distance was slightly in favor of the northern or Assiniboine line.

For the third point it is proper to consider only what would be the ruling grade for a freight division, regardless of helper grades and also the number of helper grades, and their rate of grade. The Assiniboine line gave one division of one per cent. and two of .06 per cent. in either direction, while the Dearborn gave line one per cent. on all divisions but one. There are three helper grades on the northern route, with grades of 1.5 per cent. and 1.8 per cent. against six on the Dearborn route of 1.7 per cent. and 2.2 per cent., counting helpers in both directions. The Dearborn line gave 35 miles excess of helper grade over the other.

Fourth: Rise and fall considered only where depressions are too great to be treated as velocity grades, shows a difference of 500 ft. in favor of the Assiniboine line.

Fifth. In alignment there appears to be about sixteen full circles in favor of the Assiniboine line.

Sixth. Resources. The Assiniboine line being on a lesser elevation for a greater number of miles shows more favorably for agriculture, although the country is now sparsely settled. The lines were about equal in grazing and timber resources. In mining, which is always an uncertain factor, there appeared to be greater possibilities in the Libby Creek, Lake Creek, Kootenai and Pend d'Oreille districts on the Assiniboine line than in the single Cœur d'Alene District on the Dearborn route.

Seventh. Climate. Both routes show a snowy region extending over a distance of 50 miles. There is probably an excess in rainfall on the northern line.

Eighth. The disadvantages in regard to operation on the northern line have been spoken of in the first point of comparison.

Ninth. The Dearborn line is only a few miles north of the Northern Pacific Railroad for 50 miles east of Missoula, and for a distance of 150 miles west of that city it practically parallels a branch or branches of that road. The new towns along the northern route will, without doubt, equal in importance those along the already occupied territory, with no probability of a division in business.

Tenth. In construction features the Dearborn route gave three miles in tunnels and an excess of bluff work along rivers, while the total length of tunnels by the northern route was only 4,400 ft. In bridges over large streams there was not much difference. Although the mileage to be constructed by the Dearborn route was 150 miles less, the estimated cost for grading and bridging was slightly in excess of that for the other route. In summing up all points for comparison there appeared to be a large difference in favor of adopting the Assiniboine line.

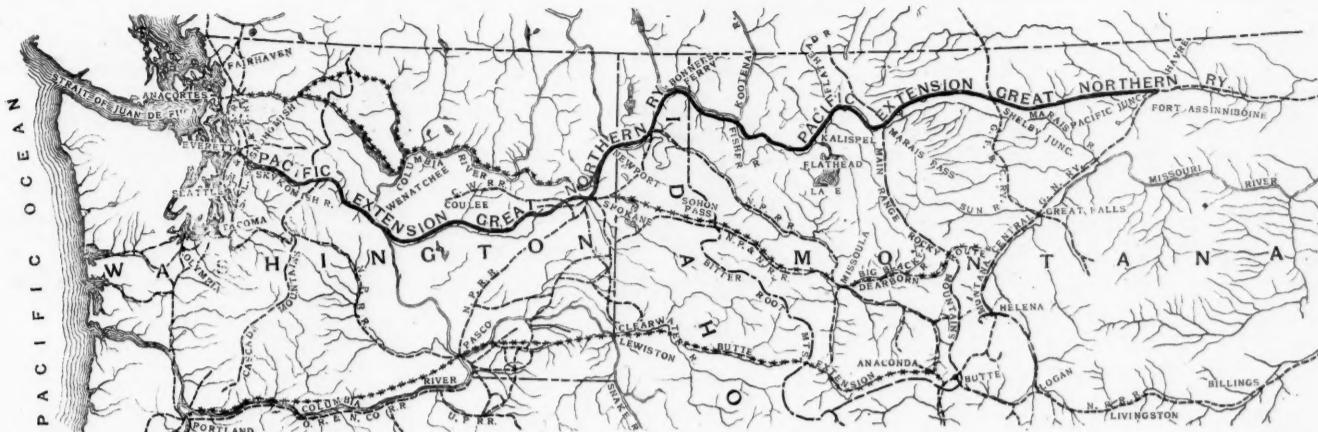
Taking up now the line from the eastern boundary of the State of Washington to Puget Sound, I will first refer to the question of the terminus.

There was one possible terminus not on the shore of Puget Sound, viz., Portland, Or. The extension from Butte via Lewiston, Idaho, was the only line which led to Portland. The difficulties on this line, previously spoken of, were sufficient to cause it to be discarded; but there were others of considerable importance, as for instance 200 miles along the lower Columbia River, one side of which is already occupied by the O. R. & N. Ry. Co.; the occupation of the territory between Lewiston and Wallula by three lines of railway, and the construction of two long and expensive bridges over the Snake and two over the Columbia, the four estimated to cost over \$2,000,000. The character of the line therefore caused the rejection of Portland as a terminus.

Puget Sound gives about 100 miles of almost continuous harbor from Tacoma northward, and the place for the terminus depended largely upon where the Cascade Range was crossed, as it was evident that the line must get down from the Cascade summit by some one of the river valleys. Generally there is a town or a harbor with a place for a town near the mouth of each stream. The Snoqualmie led down to Seattle or Everett (not in existence in 1890). The Skykomish led down to Everett and the Skagit led down to the famous Fidalgo Island, Anacortes City, one of the early selections for terminus of the Northern Pacific Railroad; it also had an outlet at Bellingham Bay by a swing to the northward. The city of Fairhaven, on Bellingham Bay, has been said to have the best harbor in the Sound. In 1889 Larrie and Bennett and their associates had built 26 miles of road, the Fairhaven & Southern, from Fairhaven to the Skagit. These parties may have thought that some transcontinental road would come down the Skagit and fail to find Bellingham Bay, or they may have thought that with 26 miles of constructed road on the western end, it would be an easy matter to fit in several hundred miles to the eastward.

I am quite certain that the passes at the head of the Skagit had never been carefully examined at the time this road was constructed. It is not the first time that a terminus has been located on the coast and a line run to it afterward. The Great Northern purchased the F. & S. R. R., and it forms a part of a line along the coast between Seattle and the terminus of the Canadian Pacific Railway. The line from the East could tap this coast line at the most favorable point and the official terminus could either be at such junction, or at the nearest suitable harbor, or at an existing city, as the railway company might dictate. The N. P. terminus on the sound being at Tacoma, and the Great Northern reaching the tidewater at some point north of this place, should the latter's terminus be as near as possible to Tacoma, or as far as possible to the north? I will leave the question unanswered. Seattle being the largest place on the sound, whatever city may be the terminus, that city is certain to have the most business for some time to come.

Referring now to the lines across Washington, as previously stated, the northern route turned southward



after leaving the Pend d'Oreille River to Spokane. It was possible to get a line across the country with quite a direct course from the head of the Pend d'Oreille at Newport to the mouth of the Spokane River, and thence down the Columbia to the mouth of the Methow or to Lake Chelan. This line would have been 26 miles shorter than to go to Spokane and then run down the Spokane River. The grade for this shorter line would have been 0.4 per cent. heavier, and the business of Spokane, town of 25,000 people, would have been lost. This Newport cut-off was only available in case some pass at the head of the Skagit was found to be favorable. It would have necessitated building more than 100 miles along the Columbia, much of the distance in cañon; and with a difference of from 40 to 50 between high and low water the cost of construction would have been extremely heavy. A line down the Spokane and Columbia rivers would have been devoid of local business, there being only a half dozen Chinamen's shanties in the whole distance of about 180 miles.

As compared with a line through Spokane and crossing the plateau south of the Columbia (the Big Bend country), and using any of the passes of the Cascade Range south of the Skagit waters, the Newport line is longer, being 32 miles longer than the adopted line, via Stevens Pass and the Skykomish to Everett.

With the question settled as to going to Spokane and crossing the plateau west of that city, the problem is reduced to that of the physical features which can be generally understood from the profiles of the various lines upon which I have shown the elevations and grades of all the available Cascade passes. The adopted line shows the shortest distance, the least rise and fall, the lowest summit at the crossing of the cascades, the least curvature, the shortest summit tunnel and the cheapest construction. It also gives the most favorable place for the construction of a temporary line to be used during the construction of the summit tunnel, which will require not less than 2½ years' time. The adopted line crossed the range through a pass discovered in 1889 by Mr. C. F. B. Haskell and named for Mr. J. F. Stevens in charge of the explorations. Among other passes examined were the Rainy, approached by Methow River, the Cascade, approached by Lake Chelan, and the Indian and the Cady, approached from the east by the Wenatchee River; Nason Creek, a branch of the Wenatchee, runs down from Stevens Pass.

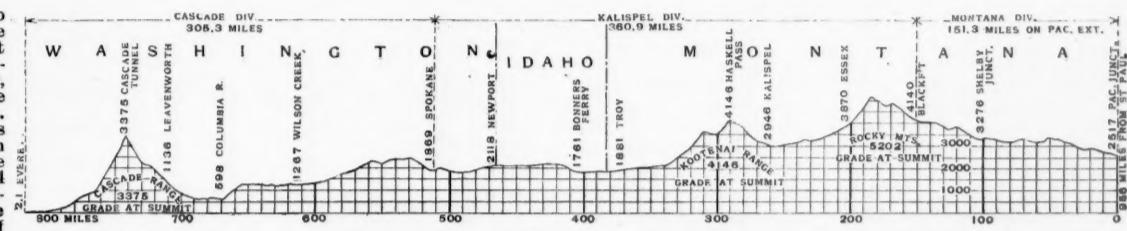
In crossing the plateau west of Spokane the line follows the drainage of Crab Creek, thereby escaping the Grand Coulee, a chasm one-half to three-quarters of a mile wide 900 ft. below the level of the plateau. A more northern line would have been obliged to cross this chasm, requiring 2.2 per cent. grade to climb out of it and also the same grade to make the descent to the Columbia River, whereas the Crab Creek route uses one per cent. in making a descent 900 ft. less, and avoids the intervening summit.

I will close with a few words about the difficulties attending this work and the rapid construction. Four hundred and thirty miles out of a total of 818 miles were in heavy timber. Along no part of the distance was there a road, and for nearly 200 miles no trail. The transportation for all surveys was by means of pack animals. In several stretches of primeval forest the accumulation of fallen trees made a progress of five miles a day on foot in exploration sufficient for the most energetic and strongest men. In making a reconnaissance of 35 miles near the Rocky Mountain summit an engineer starting out with blankets and six days' provisions on his back was without food four day's, and, after recruiting, became lost in trying to return over the same route. He finally succeeded in making the round trip at the end of 30 days. Although the Marais Pass was looked up in the United States examinations of 1854, the pass then found was 20 miles north of the one used by the Great Northern and was 2,400 ft. higher.

The reconnaissance was quite thorough and condensed profiles from barometric heights and estimated distances were made. The original barometric profile of the Assiniboine line on which I have marked the actual profile of constructed line shows several river crossings, and summits of grades, within one mile of their position as by surveyed mileage, and at elevations differing from true elevations by less than 50 ft. Spokane, distance estimated, is less than five miles off, with the accumulated errors on 512 miles. (Profile exhibited.)

The first explorations started by me were in December, 1889. Some country on the Dearborn route had been looked over by Major Rogers, in 1887.

The first preliminary surveys on the adopted line were begun in March, 1890, and grading was started in August of the same year. Tracklaying was begun Oct. 20, 1890, and completed Jan. 6, 1893, 556 miles of track were laid in 1892, and the tracklaying force was idle about three months of the year. The track gang was not stopped for unfinished grade after March, 1892. The best day's work at tracklaying was 4½ miles. The Two Medicine bridge, a wooden structure 212 ft. high and 800 ft. long, containing over three-quarters of a million feet of timber, was built in 45 days. About 5,000,000 ft. of timber were put into structures by one firm of contractors in less than two months.



PACIFIC EXTENSION OF THE GREAT NORTHERN RAILWAY.

Railroad Transfer Between Hobbs Island and Guntersville, Ala.*

Some four years ago the Nashville, Chattanooga & St. Louis Railroad bought the Tennessee & Coosa franchise, and proceeded to build a line from Guntersville, Ala., on the south side of the Tennessee River, southward to Gadsden, on the Coosa River, 37 miles. This road was entirely cut off from the Nashville, Chattanooga & St. Louis system, and to make it of some benefit a line 15 miles long was built south from Huntsville, Ala., the terminus of the Huntsville branch of said railroad, to Hobbs Island, on the north side of the Tennessee River, 20 miles below Guntersville, and a transfer boat and barges were put in operation between the last-named points.

The transfer plant consists of two stern-wheel steamers, one of 90 tons burden and one of 40 tons, and two double track barges, one for three and one for eight cars. These boats cost \$28,500. The time occupied in making the trip of 20 miles between Hobbs Island and Guntersville is about two hours.

There is a rise of about 40 ft. in the Tennessee River to contend with, and to be able to operate this transfer at any stage of the water, the track was built on an incline from high water mark to within 2 ft. of the bed of the river, both at Hobbs Island and Guntersville. At Hobbs Island the incline is straight on a minus 3½ per cent. grade (185 ft. per mile) and consists of 400 ft. on fill, 400 ft. on piled trestle, 240 ft. of riprap bank and 240 ft. of crib, making in all 1,370 ft. of incline or a total fall of 47.9 ft.

The cribs at Hobbs Island and Guntersville are alike and were built of 12 x 12-in. timbers. All spaces were thoroughly filled with stone; the ties and rails were then put on and the whole sunk into place.

Cradles are used at both landings. That at Hobbs Island is 140 ft. long. It is built of pine timber and the track on it is a plus 3% per cent. grade (198 ft. per mile). The apron at the end of the cradle allows for the rise and fall of barges when loaded or unloaded. This apron is 20 ft. long and has provision made for 2 ft. vertical motion and 1 ft. lateral motion. A "V" in the apron allows the nose on the barge to fit into it, and the barge is held firmly against the apron by means of a windlass and chain.

We do not make stub rail connections from barge to cradle, but use instead the following method, designed by our Chief Engineer: The ends of the rails on the apron are turned out at an angle of about 30 deg., the bend being at the point where the rails on the barge will reach when it is brought to place against the apron and ready for transfer. The ends of the rails on the barge are planed off at an angle to correspond with the angle in the rail on the apron, being really a pair of split points, the planed portion being about 8 in. long. The rails on the barge are fitted with a device by means of which they can be raised 4½ in., and at the same time the gauge narrowed ½ in. The rails are raised before the barge is brought to place, and then after the barge has been made fast to the apron they are lowered, and at the same time they open to proper gauge and make practically a continuous rail from apron to barge.

On account of difficulties of location encountered at Guntersville, it became necessary to put a 10 deg. curve in the incline at that point, and also an undulating grade had to be used, varying from level to 3½ per cent., and a specially constructed cradle had to be built

* A paper by G. D. Hicks, Superintendent of the Nashville, Chattanooga & St. Louis, at Tullahoma, Tenn., read at the meeting of the American Society of Railroad Superintendents at Chicago, Oct. 12, 1893.

so that it could be used on both curve and tangent, and on the various grades. This cradle consists of a 20-ft. apron, eight 16-ft. sections on wheels, one 19-ft. sliding section and an 8-ft. feather rail, making 175 ft. over all and built on a plus 2.4 per cent. grade (127 ft. per mile). These sections are coupled together on each side, by having two pieces of angle iron bolted on the ends of the section with 6-in. bolts passing through the angles. These bolts are not screwed up tight, but allow plenty of play for the sections to take the curve. The rails on the side of this cradle which becomes the inside of the curve, are 15 ft. 10½ in. long; those on the other side, 16-ft. Rails are not spiked except at the joints, but are held together by means of tie rods. When the cradle is on the tangent the 16-ft. rails make a close joint, and a "dutchman" made of a section of a rail with the base planed off, 1½ in. long, is inserted in the open joints on the other side. When the cradle is put on the curve these "dutchmen" are taken out so as to allow the joints to close up. The bolt holes in the rails are slotted so as to allow for this movement. The cradles are fitted with drawheads so that they can be handled by an engine, or they can be moved by a boat as well.

Tyler's Train Tablet Apparatus.

BY ARTHUR H. JOHNSON.

Most transportation men are somewhat familiar with the old English train staff and ticket system, the object of which is to safely conduct traffic on single-track rail-

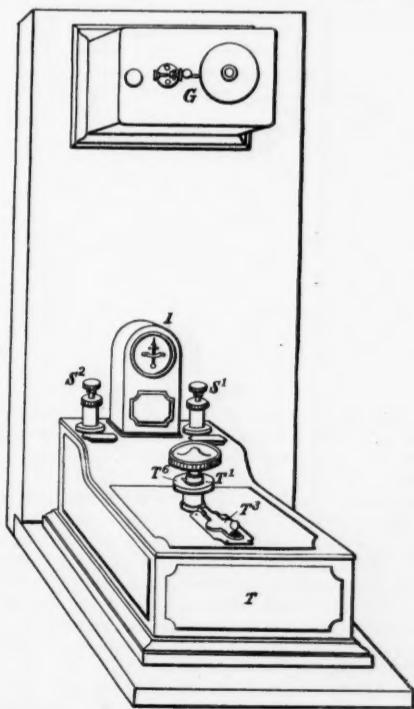


Fig. 1—External View.

Tyler's Train Tablet Apparatus for Single Track Railroads. roads. The portion of track between any two adjacent passing stations is provided with a wood or metal staff, plainly marked as belonging to that portion of track only. At each passing station there is a box containing metal tickets, bearing marks corresponding with those on the

staff. These boxes are automatically locked by the absence of the staff, and it is necessary to insert the staff to obtain ticket. There is a hard and fast rule which makes it necessary for an engineman to first obtain the staff, or a ticket, before proceeding on his journey. As there is only one staff for each section, it is necessary where trains follow each other in the same direction to give a ticket to all but the engineman of the last train. The engineman and conductor of each train must have seen the staff before they are warranted in proceeding. The staff is given to the last train previous to a change of direction. The ticket box at that end is thus locked, and upon arrival at the other end the staff is delivered to the attendant, who proceeds to unlock his box and issue tickets for the opposite direction, if more than one train is to go before another change in direction.

There is a point in the practice of staff working for single lines which appears to perplex most railroad men not conversant with the matter. They invariably ask why a separate mode of block working should be recommended for single tracks, instead of the regular block system as used on tracks worked in one direction only. But when we look closely into the question, we find that the circumstances in the cases vary greatly. It is a well-known fact that train despatching for a single track is a much more onerous duty than that for a double track road, because a mistake as regards a meeting place on single track is almost sure to have fatal results. When we consider the grave responsibility attaching to the working of a single track road, it is easier to understand why men of great experience in these matters should be strongly in favor of something surer and more tangible than even the best signals. Such is the staff system, as an engineman cannot easily make a mistake as to the presence or absence of a staff in his cab. The adoption of the standard code of train despatching was a great stride in the right direction, but when we consider how many chances of mistake there are, even if despatchers were infallible, we must be far from satisfied with the telegraphic order system. Mistakes may occur through bad writing or careless sending of orders, and signals may accidentally show "clear" when they should stand at "danger." The accident record stands open to all. The following quotations from Mr. J. A. Anderson's book, "The Train Wire," are apropos: "To the uninitiated the mental operations would be simply bewildering which are required of a brain from which issue for hours, without apparent effort, the instructions under which the trains on a busy road are moved expeditiously and harmoniously." Referring to the need of a standard code throughout the railroads of this country, he says: "We have here a cogent reason for so systematizing this business as to render the working of it as nearly automatic or mechanical as possible, and thus eliminate, as far as practicable, the risk arising from deficiencies of the human agency."

The first improvement on the staff and ticket was made by Mr. Tyer, the well-known engineer and manufacturer of block instruments, and his machines are extensively used in Great Britain and Russia. The improvement consisted in the storage of a number of staffs or tablets at each passing station, which staffs were contained in receptacles, so constructed on the interlocking principle and electrically connected that only one staff could be issued for any section of track at one and the same time. The liberty of issuing another staff at either end was dependent on the insertion of the issued staff in the machine at the station remote from that at which the train received it. The next important step was taken by Messrs. Webb & Thompson, who devised a very compact machine, which allowed of the re-insertion of a staff at the station from which it was issued, thus allowing a work train to proceed to an intermediate point and return. This was soon followed by a similar improvement in Tyer's machine. As Webb & Thompson's machine was described in the *Railroad Gazette* of Aug. 1, 1890, I will confine my present description to the latest machine manufactured by Tyer.

Fig. 1 is a perspective view of one complete train tablet issuing and receiving machine. The case *G* contains a bell and polarized relay magnets, while the metallic case *T* contains revolvable rack, carrying the train tablets, together with a commutating wheel, interlocking pawls and releasing magnet; also bell, lock and switch contacts. *I* is an index, the deflection of which indicates when a tablet can be taken out. *S¹* is a plunger, for bell signaling to the distant station, and *S²* is a plunger whereby the local unlocking circuit is completed, the completion of that circuit depending entirely upon the proper position of the relay. *T'* is a large knob, whereby the tablet rack may be turned when released, so as to bring a tablet under a slot in the case, covered by the lid *T''*. Figs. 2, 3 and 5 show details of the interlocking mechanism inside the case, the commutating disk being more clearly shown in the diagram of circuits, fig. 6.

The axis *T'* has three circular disks, rigidly attached thereto, viz., *D*, *W* and *C*, fig. 2. The disk *D* has a number of radial slots adapted to carry tablets *T²* and *T⁴*, fig. 3. There are also vertically projecting teeth which engage with a cam lock on the lid *T''*, when the latter is raised. This lid must therefore be closed when movements of the mechanism are made. The disk *W* is that which engages with the locking pawls. It has two sets of teeth facing in opposite directions. The horizontal teeth *W⁴* engage with a back lock pawl *W⁵*, whose

office is twofold, viz., to prevent turning the disk back more than one notch when a tablet is inserted, and to break an electric contact *W⁸*, fig. 6, when a tablet is inserted, but inadvertently not turned back. *W³*, shown in fig. 5, is the magnet operated releasing pawl, engaging with the vertical teeth *W²*, upon which depends the

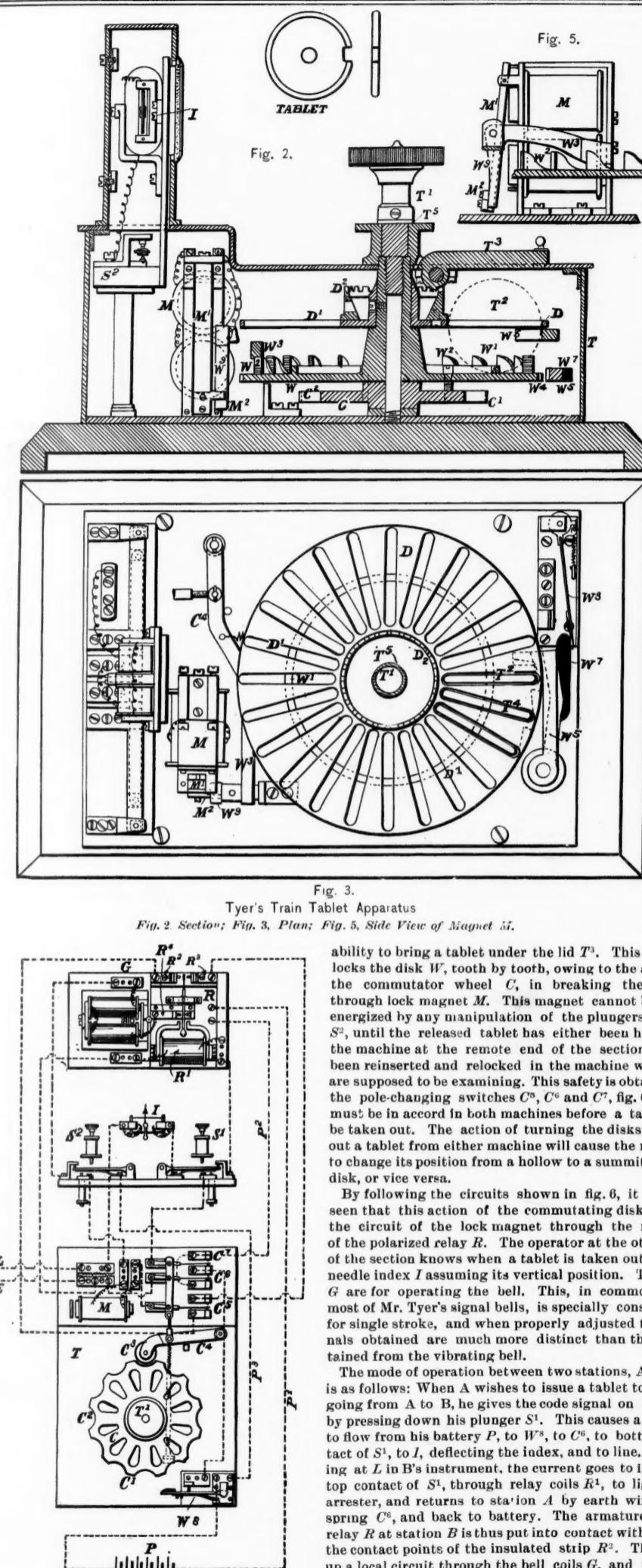


Fig. 6—Electrical Connections in Tyer's Train Tablet Machine.

ability to bring a tablet under the lid *T³*. This pawl relocks the disk *W*, tooth by tooth, owing to the action of the commutator wheel *C*, in breaking the circuit through lock magnet *M*. This magnet cannot be again energized by any manipulation of the plungers *S¹* and *S²*, until the released tablet has either been housed in the machine at the remote end of the section, or has been reinserted and relocked in the machine which we are supposed to be examining. This safety is obtained by the pole-changing switches *C¹*, *C²* and *C³*, fig. 6, which must be in accord in both machines before a tablet can be taken out. The action of turning the disks to take out a tablet from either machine will cause the roller *C³* to change its position from a hollow to a summit on the disk, or vice versa.

By following the circuits shown in fig. 6, it will be seen that this action of the commutating disk breaks the circuit of the lock magnet through the medium of the polarized relay *R*. The operator at the other end of the section knows when a tablet is taken out by the needle index *I* assuming its vertical position. The coils *G* are for operating the bell. This, in common with most of Mr. Tyer's signal bells, is specially constructed for single stroke, and when properly adjusted the signals obtained are much more distinct than those obtained from the vibrating bell.

The mode of operation between two stations, *A* and *B*, is as follows: When *A* wishes to issue a tablet to a train going from *A* to *B*, he gives the code signal on *B*'s bell by pressing down his plunger *S¹*. This causes a current to flow from his battery *P*, to *W⁸*, to *C⁶*, to bottom contact of *S¹*, to *I*, deflecting the index, and to line. Entering at *L* in *B*'s instrument, the current goes to index *I*, top contact of *S¹*, through relay coils *R¹*, to lightning arrester, and returns to station *A* by earth wire *E*, to spring *C⁶*, and back to battery. The armature of the relay *R* at station *B* is thus put into contact with one of the contact points of the insulated strip *R²*. This sets up a local circuit through the bell coils *G*, and the current flows from the battery to *W⁸*, to top contact of *S²*, through coils of *G* to strip *R⁴*, to armature, base plate *R*, and back to battery by wire *P¹*.

B replies to this signal by pressing and holding down his bell key *S¹*. Then, assuming that no tablet is out at either *A* or *B*, and that the commutator rollers *C* rest in hollows at both stations, a current will flow from *B*'s battery through the relay coils *R¹* at station *A*, over a circuit identical with that formed when *A* pressed down

his bell key, and the armature of R^1 will make contact with R^2 .

In order to release A's knob, T^1 , it is necessary for him to press and hold down his lock plunger S^2 . This will cause a local current to flow from his battery to W^2 , through P^2 to S^2 , through coils of magnet M to spring C^5 , to contact point R^2 , to armature and base plate R and back to battery. The steady deflection of his index I by the passage of the current from station B will show him when he can thus energize his lock magnet. As the tablet rack has now been released by magnet M , his next action is to turn the knob in the opposite direction to the movement of a clock hand, thus bringing a tablet under the lid T^2 . He then takes out the tablet and gives it to the engineman, who hangs it on a hook in his cab and proceeds on his journey. Simultaneously with the turning of the knob, the roller C^3 was forced from a hollow to a prominence of the commutating wheel C , and the contact springs C^3 , C^6 , and C^7 now stand in contact with the opposite points to those shown as in contact. This change of contacts prevents the issue of another tablet at either A or B until the free tablet has been properly returned at either A or B . To prove this, we will follow the circuits. If A now asks B to unlock another tablet, and B holds down his plunger S^1 , the armature of R^1 makes contact with R^2 as before, but as C^3 is now in contact with the wrong point, the circuit through lock magnet M remains open, so that no manipulation of S^2 will unlock the knob T^1 . For the same reason A will now fail to unlock the instrument at B .

Upon the arrival of the train at station B the tablet received at A is handed to B who opens his lid T^2 , and pushes the tablet into a recess in the rack. At the same time the contact at W^2 is broken by the tablet, and it remains so, obstructing all intercourse between A and B until the knob T^1 is turned back one tooth thus automatically relocking the tablet in the machine at B , by the action of the pawl W^3 previously described. It is evident that this rehousing of the tablet at station B places the roller C^3 with its attendant switch springs C^3 , C^6 , C^7 , in a corresponding position to that at station A . B can now allow A to issue another tablet, and holding down his bell key S^1 a current will flow from the battery at B through the relay coils R^1 , at A , but in the opposite direction to the previous current. Starting from battery P at station B , the current flows to W^2 , to C^6 , to E , and entering A 's instrument at E to relay R^1 , through top contact of S^1 to I , and back to station B by line L , then to index I to bottom contact of S^1 to C^7 , and back to battery by wires P^2 and P^1 . By changing the direction of the current through relay R^1 at station A , its armature is now caused to touch point R^3 , which is in connection with the new contact made by C^5 .

Then, upon A 's pressing down his lock plunger S^2 , a local current energizes the lock magnet M . The current flows from battery P to W^2 , through P^3 , to bottom contact of S^2 , through coils M to spring C^5 , to contact point R^3 to armature, to base plate R and back to battery by P^1 . The issue of tablets for trains going from B to A is identical in operation with the foregoing descriptions, except that B must be substituted for A , and vice versa.

At speeds up to about twenty miles an hour, the tablets or staffs are readily exchanged by hand. At high rates of speed the staffs are exchanged by an apparatus fixed alongside the track, similar in construction to the ordinary mail bag apparatus; in fact, precisely the same arrangement could be used. One good feature of this system is the absolute safety obtained as regards immunity from that fruitful source of accident, viz., the misplaced switch. Mr. Webb guards against this by simply forming a large key on the end of each staff, and constructing the corresponding locks on the switches so as to prevent the withdrawal of the staff, until the switch is reset and locked for the main track. Mr. Tyer accomplishes this by providing a special lever at each switch, which can only be unlocked by inserting a tablet, which is then locked by the reversal of the switch lever.

Apart from the rigid safety of these appliances, I may point out that the usual delays in waiting for orders are almost entirely obviated, while the large margins of safety, very advisable in the telegraphic order system, are entirely unnecessary with these interlocking dispatchers. As an illustration of this I may mention the fact that a certain railroad was recently enabled to indefinitely postpone the construction of an extra track by the adoption of the interlocking staff.

Both the Tyer and the Webb & Thomson machines are on exhibition at the World's Fair. The Johnson Company has received numerous inquiries from prominent roads concerning the operation of these machines.

The Management of Terminal Yards.*

BY T. F. WHITTELSEY,
General Superintendent Toledo & Ohio Central Railway.

There is no part of a railroad that requires to be in good working condition more than a terminal yard. When it is open and trains are admitted and forwarded promptly, the whole line tributary to it is also in good condition. When, on the other hand, the yard is crowded, the line soon becomes demoralized by delays, trains being held out, and overtime resulting. The theory that a car should be constantly in motion from

*A paper read at the meeting of the American Society of Railroad Superintendents, Chicago, Oct. 12.

the time it is bailed until it arrives at destination applies in a terminal yard as well as on other portions of the line.

Terminal yards are generally located without due regard to the requirements, and are often the result of the addition of tracks from year to year, laid by no carefully considered plan. This, perhaps, is the most important cause of delays. There should be no important changes in tracks and switches in yards until the plans are carefully analyzed by the men immediately controlling them. Too frequently the plans originate in the mind of some official who lacks the practical experience that a sub-official possesses. Tracks are often too short for a maximum train, necessitating doubling over that portion of the train projecting beyond the clearance point, which delays some other work. Or, the tracks are built too long and without crossovers in the center, so that time is wasted cutting over and filling out from track to track. Again, switch fronts, or ladders, are sometimes laid on a curved line instead of on a straight one, as they should invariably be. This is necessary to enable the enginemen and trainmen to see distinctly their own or fixed signals while switching. The poling system in switching cars at large terminal yards is too much neglected. It has been demonstrated that the use of poles cheapens materially the cost of separating trains at terminals. Yards should be constructed with reference to the system even if poling is not at once adopted. The ideal arrangement of the terminal yards of a system demands that the facilities for the grouping of cars be equal at each terminal.

As this is a period of evolution from hand to air-brakes on freight cars, it will, for a time, be a problem whether to group air-braked cars together or not. While the former consumes more time at terminals, the other and worst class of delays, viz., from wrecks, caused by failure to utilize all the power brakes, will be reduced. On well managed roads the "expected arrival" of freight trains is communicated to the yardmaster by the train despatcher. This is important when, for any reason, the efficiency of the motive power has been impaired, and it obviates the delay of from one to two and a half hours which generally intervenes between the time of calling of the crew and the time the train is called for. Of course the train despatcher sometimes miscalculates, and lists of expected arrivals should be checked with actual arrivals and the defects located.

The billing department should, for a terminal yard, invariably be under the yardmaster, who has knowledge of the trains which are coming. If this department is promptly on hand it will have the train chalked or carded to switch in a very short time. The separation of the train and other regrouping can then begin at once. Every failure to mark cars promptly, correctly and distinctly should be remorselessly followed up. One great advantage of having the billman report to the yardmaster is the assistance obtained in the way of having his attention called by the billman to odd cars which may, for many different reasons, be scattered about the yard. The billman can also keep the yardmen advised as to perishable cars on cripple tracks detained by dilatory repairmen.

Every car to be moved, whether loaded or empty, should be carded, so that the instant the man whose duty it is to move the car sees it he may know to what point it is destined. Some roads object to carding with names of stations for the reason that it may disclose to competitors the nature of the traffic. This may be easily overcome by substituting numbers, numbering the stations consecutively between grand termini, using odd numbers, for instance, running south, and even numbers north. This system lessens delay in yards, for at night, or in rainy weather, when check marks are indistinct (as also are lettered cards having their destination shown in ordinary pen or pencil marks), a report of cars may be made while the rear polar is ascertaining the destination. At large terminals, liable to labor troubles, it is a good plan, in addition to the above, to have cards local to that yard. These may be of colors and shapes as distinctive as the numbers referred to. For instance, for Pennsylvania Co. delivered, let the card be of the keystone shape; and for the Belt Line, a circular card; the idea being that in case of the introduction of new men, they may quickly learn the "ropes."

A man in charge of a large terminal yard has an opportunity to display nearly as great executive ability as a superintendent. He has at his command more men and locomotives than many a superintendent. He can save or lose to the company large amounts daily. He should be a man who has been through the train or yard service, preferably the former, for his knowledge and training as road conductor will have been such as to give him that rare quality, in a general yardmaster, of thinking of two or more places at a time, which a man running a train with success must be forced to do; whereas, on the other hand, the yardman is too apt to apply his efforts in one congested point, forgetting others.

The ideal yardmaster must be a clear-headed, tireless man, who visits all points of his yard daily, keeps a sharp eye on the force, being personally acquainted with his men and their habits. He must anticipate fluctuations in the traffic and regulate the force accordingly. He should be supplied with a good-sized office and help enough to keep an accurate record of his transactions, both relative to the movement of traffic and to matters of discipline. Division yardmasters should be selected

with great care and under the direction of the superintendent. They should be good switchmen, or, at least, have a correct knowledge of switchmen's duties, unswerving in loyalty and be able to handle correspondence.

In the selection of conductors and brakemen it is good practice to promote them from switch tenders, billmen and other men in similar positions which now abound in large yards. Men for these lower places should be chosen with special regard for the future. In hiring men from other roads, no one should be taken who cannot furnish first-class letters of recent date, and it should be understood, as one of the conditions of his enlistment, that he will not be retained in the service if his references, when written to, do not give him a "clean bill of health." No man should be hired for any position in the yard unless he passes the personal inspection of the general yardmaster. There are two things a general yardmaster must fight continually, whiskey and clanishness. It is not necessary that the rank and file of the large yards of this country should be recruited from one nationality, as we can see, by newspaper accounts of switchmen's strikes, has been often the case.

The sooner the general managers make a careful study of the foregoing subjects, the sooner they will stop leaks, the size and importance of which will surprise them.

A 1,000-H. P. Electric Locomotive.

The locomotive shown was designed by Messrs. Sprague, Duncan & Hutchinson, Ltd., and is being built under their supervision on the order of the North American Company. It is intended for special experimental work in handling heavy freight trains and switching, and is built for slow speeds and heavy traction. The machine is not yet entirely finished. It has been built piecemeal, the running gear and cab, much of the furnishing, and the assembling being done at the Baldwin Locomotive Works, Philadelphia.

The general features of the locomotive are shown in the engravings. The frame is of steel with exceptionally deep pedestals, and is arranged to receive four pairs of boxes fitted with the usual adjustments. The pedestal boxes are of a special form, are made of cast steel, and project inward to form the brackets which carry the motors. The lower sides are arranged to be dropped out so that the brasses can be readily replaced. These boxes render the double service of carrying the axles upon which the armatures are rigidly mounted and the field magnets concentric to them. A stirrup projects from the upper portion of each to engage the middle section of inverted elliptic springs, the four sets of which are arranged on the double three point suspension system. In this way the whole is carried on equalizing springs.

The drivers are 56 in. in diameter, the first and last pairs only being flanged. They are close coupled, with only 4 in. between the faces, and the connecting rods are jointed.

It will be noted that the weight of the armature is directly on the wheels, and not on the journals, while that of the field magnets is on the journals through the pedestal boxes. There is then absolutely no spring support of any kind provided for any part of the motors. This is contrary to the prevailing opinion of what is necessary in a machine of this type. Another difference distinguishing this locomotive from the large one designed for the Baltimore & Ohio Railroad tunnel is that the system is a unit, the motors all forming part of a single system having a rigid wheel base of 15 ft., and being coupled together by quarter-cranked connecting rods instead of having two or more bogie trucks with independent, spring-supported motors.

Among the considerations determining the construction were, the simplicity and directness of application, the impossibility of operating two or more motors in series satisfactorily on a slippery track when the full tractive effort is required of them without a mechanical coupling, and the likelihood that with large drivers, each flexibly connected to the system, the troubles anticipated from rail impact would not be as serious as had been commonly supposed. The motors, four in number and alternating in position, are of the "Continental" ironclad type, the field magnets being formed of two steel castings, and having two field coils placed at the ends of the motors with their planes vertical, thus forming two consequent and two salient poles. The magnets are compound wound, the shunt field being light and only sufficient to keep the speed within reasonable limits at light loads and for returning current to the line when running on down grades. The armatures, which were built by the Westinghouse Electric & Manufacturing Company, are of the slotted type, the slots having curved bottoms and tops and contracted gaps. Each slot carries four wires, but there is only one turn of wire to each bar of the commutator, and the wires are threaded through tubes imbedded in the slots. The winding is of the two path type, giving the current only two paths in the armature. Its dimensions are:

Diameter.....	31 in.
Length of active part.....	21 "

Number of armature coils..... 237

The height of the steel casting over all is 46 in., and the clearance from the top of the rail 5 in. The induc-

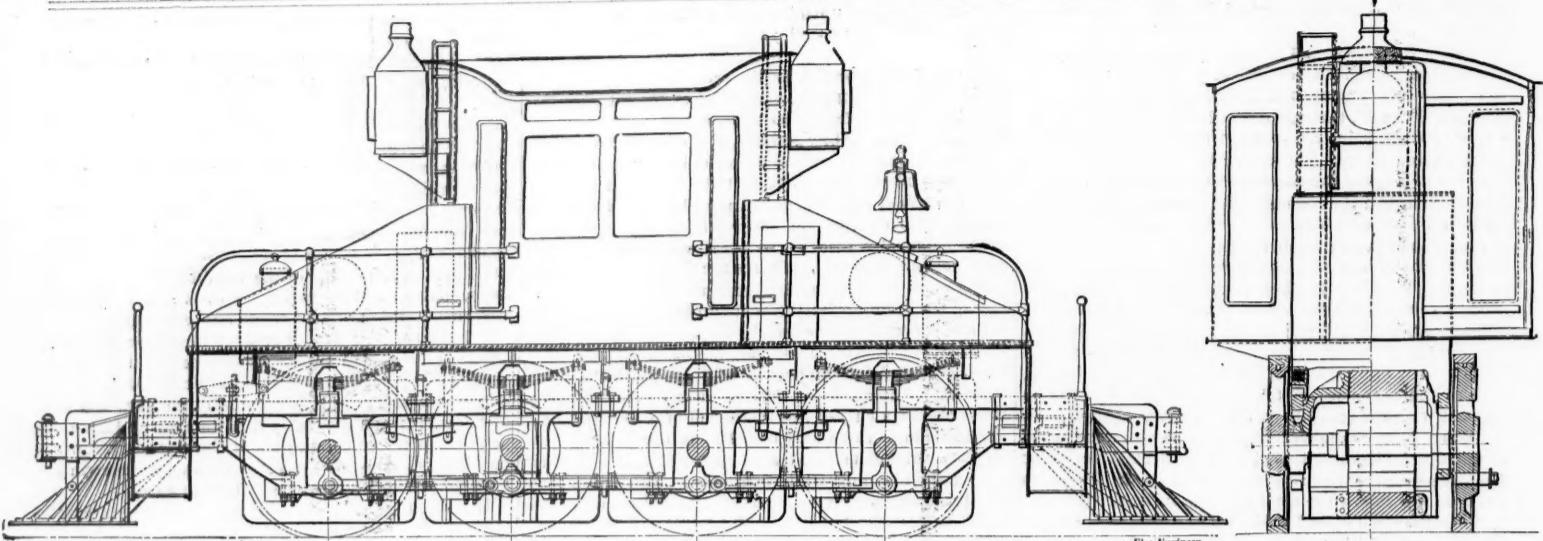


Fig. 1—Side Elevation.

Elec. Engineer

Fig. 3—Section through Frame, Pedestal Boxes and Field Magnet Castings

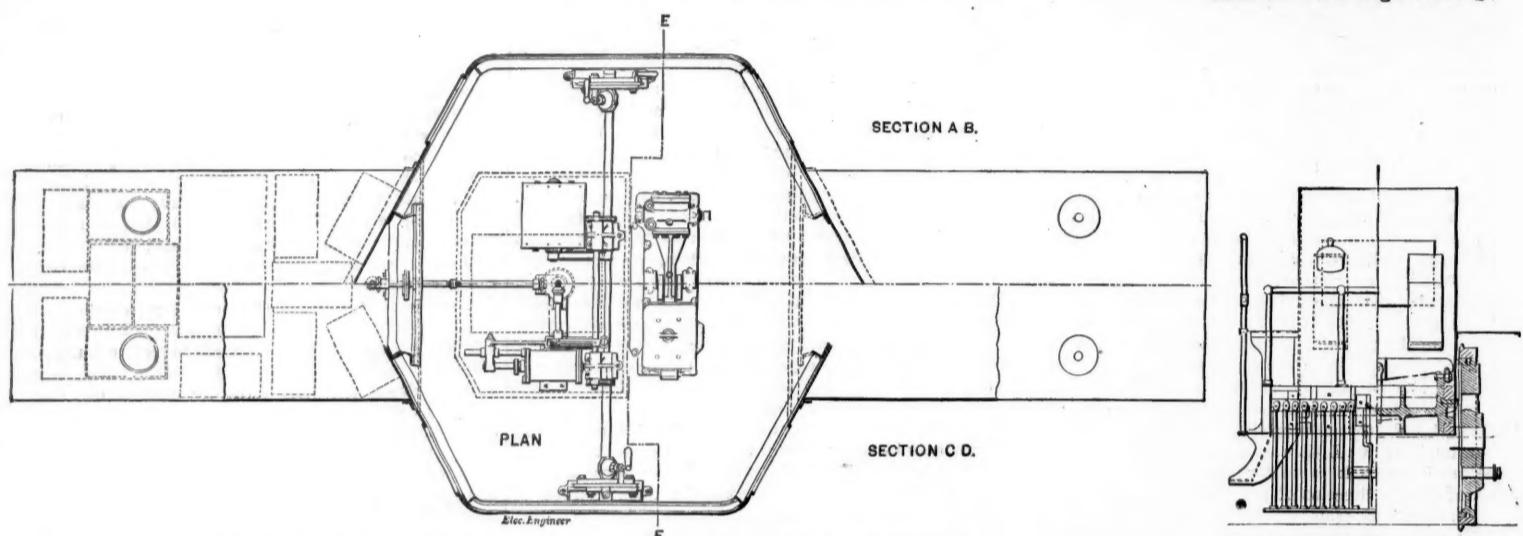


Fig. 2—Plan of Cab, Showing the Controlling Apparatus, Air Cylinders and Electric Pump.

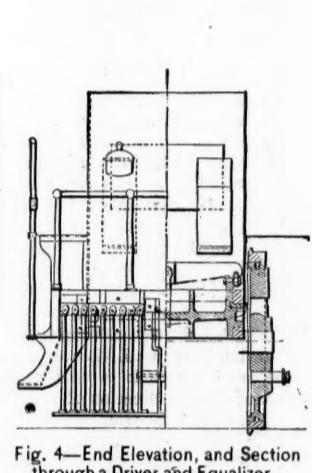


Fig. 4—End Elevation, and Section through a Driver and Equalizer.

THE SPRAGUE 1,000-HORSE POWER ELECTRIC LOCOMOTIVE.

tion in the teeth of the armature is very high, being about 22,000 C. G. S. lines.

The motors are wound for 800 volts at 225 revolutions, this being the equivalent of 35 miles an hour when in multiple. They will safely carry 250 amperes of current, giving each motor about 250 H. P. output at 93 per cent. efficiency, and in emergencies can easily stand a great deal more than this. The motors will readily exert a drawbar pull of 30,000 lbs., and have a system of regulation giving any speed from zero to 35 miles an hour under full normal tractive effort. They can start very heavy loads and have ample capacity to slip the wheels.

The regulation is of the series parallel system with resistance thrown into, then cut out of circuit, then again into circuit while changing. The groups are, first, all in series with and without variable resistance, then two in parallel by two in series, then four in parallel, with similar use of rheostat. The four motors are used all the time, there being no position in which one alone is cut out, not even in changing over. These various changes are effected by means of a large contact cylinder on which the three main combinations are made, and a fire-proof rheostat system with the contact arm geared in the proper ratio to the main cylinder.

To effect the prompt operation of this controlling system, which can be moved slowly by hand, air pressure from the same tanks that supply the air-brakes is employed. This is automatically kept at a constant pressure by a special electric pump. It was deemed essential that it should be unnecessary for the engineman to watch-indicators or gauges of any kind in order to know on what switch position he was running, and to this end the air valve, which he controls, is mounted on a small lever so geared as to move back and forth as the main cylinder revolves. His hand is thus carried along so that he knows intuitively the position of the cylinder, and has no reason ordinarily to use his eyes and ears for purposes inside the cab. There is a reversing switch which is automatically locked in all but the "off" position of the main cylinder, thus preventing reversal under wrong conditions. There are ammeters, voltmeters, a whistle, bell, headlights, and the usual accessories. The American driver brake is applied to every wheel. The controlling apparatus is all carried in the cab.

The total weight of the locomotive will be about 120,000 lbs. equally distributed on the drivers, and it is by far the largest yet built. The engravings and description are from advance sheets from the *Electrical Engineer*.

The Awards in the Transportation Department, World's Fair.

We give below a complete list of the awards made in the Department of Transportation, World's Columbian Exposition, together with a list of the jurors. With this we give also a concise account of the method pursued at the Chicago World's Fair in the bestowal of medals and diplomas. There existed among exhibitors generally a profound ignorance upon the subject, notwithstanding the distribution of thousands of circulars, describing exactly the whole proceedings to be adopted; which proceedings were clearly calculated to insure exact justice so far as may be expected of human judgment. The facts that each judge must appear on record, giving his reasons for or against an award; that his report would be discussed by a committee of experts, whose professional character was involved in their approval of his report or in its rejection; and that an appeal from that committee could still be had upon a showing of incompetency or of malevolence, constituted a security in favor of the exhibitors not heretofore provided at national expositions.

Of course, the proceedings in the committee were private, but we have been informed by some of its members that there was an earnest wish apparent to recognize good work or useful novelty and that the foreign judges were prejudiced rather in favor of American inventions, although remarkably well informed in their several pursuits. It was not customary to assign a foreign judge to examine the exhibits from his own country. The American experts were much impressed by the beautiful work from abroad, and happy to be able to confer an award upon exhibitors who had come from a distance to grace this Fair. Although many of the reports of individual judges were dissented from by the committee, the final conclusions were substantially unanimous, we are told, in every case.

The regulations governing awards were promulgated in 13 carefully considered rules, by the World's Columbian Commission, which were strictly obeyed in all the proceedings of the judges, and which may be epitomized as follows:

1. Awards shall be granted upon specific points of excellence or advancement formulated in words by a board of judges or examiners who shall be competent experts."

2. This board of judges shall be divided into 13 committees, one for each of the great departments of the Exposition.

3. The individuals of these committees shall be competent experts, and shall examine such exhibits as shall be assigned them by the Executive Committee on Awards: provided, however, that if thought important by the departmental com-

mittee, the Executive Committee shall appoint a special committee to assist the individual judge in the preliminary examination of a particular exhibit. There shall be a foreign representation upon each of the 13 committees.

4. Each committee shall choose a president, vice-president and secretary, and keep a record of proceedings.

5. Each judge shall report in writing the result of his examination of each exhibit assigned to him; and if it is deemed worthy of an award, "he shall formulate in words the specific points of excellence or advancement disclosed thereby." Every such report shall be submitted to the Committee of which such judge is a member. If the Committee shall differ from the conclusion of the individual judge, then another member of the Committee shall be assigned to examine the exhibit and to make report. All these reports shall go to the Executive Committee on Awards.

6. The Executive Committee may refer such cases of differing opinion back to the departmental committee for re-examination, and its finding shall then be conclusive.

7. Foreign governments shall be invited to recommend experts in the various departments. They shall be notified "that there will be but one class or kind of medals, which will be made of bronze and be works of art, and be accompanied by parchment diplomas, on which shall be formulated the specific points of excellence presented by the exhibit receiving the award." The medals and diplomas to be awarded are by authority of the Congress of the United States, and are prepared by the Secretary of the Treasury.

8. Any exhibitor becoming a judge, his exhibit shall be excluded from award.

9. Any exhibitor may have his exhibit exempt from award by notifying the Executive Committee.

10. Defines the date of commencing work of judges, with necessary exceptions.

11. The results of the work of the judges shall be presented by the Executive Committee to the full Committee on Awards, and by that committee to the World's Columbian Commission, by whom the formal promulgation of the awards and the distribution of medals and diplomas shall be made with appropriate ceremonies.

12. Each departmental committee shall present a comprehensive report, to form part of the history of the Exposition.

13. The Executive Committee on Awards shall have the right to avail of the aid of any members of the Committee on Awards, or of any competent agency "whose aid ought, in its best judgment, to be invoked."

Under these regulations there were selected for the several departments about 500 experts in different callings.

The exhibits in Department G (Transportation) were catalogued and examined according to the following:

CLASSIFICATION.—DEPARTMENT G, TRANSPORTATION.
Group 80. Railways, railway plant and equipment. Classes 499 to 503.

Group 81. Street car and other short line systems. Classes 504 to 507.

Group 82. Miscellaneous and special railways. Class 508.
 Group 83. Vehicles and methods of transportation on common roads. Classes 509 to 523.
 Group 84. Aerial, pneumatic and other forms of transportation. Classes 524 to 527.
 Group 85. Vessels, boats, marine, lake and river transportation. Classes 528 to 536.
 Group 86. Naval warfare and coast defense. Classes 537 to 542.

The Committee of Judges appointed for Department G, and the groups in which they respectively served, appear in the following list:

President: Hermann Von Littrow, Austria.
First Vice-President: Prof. Francis Elgar, Great Britain.
Second Vice-President: Concas, Captain y Palau, V. M., Spain.
Third Vice-President: Charles Paine, United States.
Secretary: Prof. Alex. Oldrini, Italy.
Assistant Secretary: James M. Lauder, United States.

FOREIGN.

Akyama Hirota, Japan. Group 83.
 Browne, Capt. Orde, Great Britain. Groups 85, 86.
 Barattoni, Signor C. A., Italy. Groups 80, 81, 82.
 Borries, Herr von, Germany. Groups 80, 81, 82.
 Concas, Capt. y Palau, V. M., Spain. Groups 85, 86.
 Elgar, Prof. Francis, Great Britain. Groups 85, 86.
 Haarman, Hon. A., Germany. Groups 80, 81, 82, 84.
 Grosser, Major, Germany. Groups 85, 86.
 Hudson, Robert, New South Wales. Groups 80, 81.
 Littrow, Hermanna von, Austria. Groups 80, 81, 82.
 Oldrini, Prof. Alex., Italy. Groups 80, 81, 82.
 Thrupp, G. H., Great Britain. Group 83.
 Barandon, Capt. C., Germany. Group 83.
 Ulbricht, Dr., Germany. Groups 80, 81, 82, 84.
 Unce, Capt. W., Sweden. Groups 85, 86.
 Mervago, Capt. D., Russia. Group 86.
 Martins, J. de Toledo, Brazil. Group 86.
 Cologan, Capt. J., Spain. Group —.

DOMESTIC.

Clements, W. L., Michigan. Groups 80, 81, 82, 84.
 French, Fred L., Boston. Group 83.
 Goss, Prof. Wm. F. M., United States. Groups 80, 81, 82, 84.
 Gibbs, George, Wisconsin. Groups 80, 81, 82, 84.
 Herr, E. M., Riverside, Ill. Groups 80, 81, 82, 84.
 Hooper, Dr. W. B., Huntsville, Ala. Group 83.
 Johnson, Hugh, Detroit, Mich. Group 83.
 Berry, Capt. R. M., United States Navy. Group —.
 Jacques, Capt. W. H., South Bethlehem. Groups 83, 86.
 Johnson, R. M., Illinois. Groups 80, 81, 82, 84.
 Loree, L. F., Cleveland. Groups 80, 81, 82.
 Lauder, James M., South Boston, Mass. Groups 80, 81, 82.
 Miller, Irvine, Chicago. Group 83.
 McLean, Henry C., Wilmington. Group 83.
 Paine, Charles, Tenafly, N. J. Groups 80, 81, 82, 84.
 Shaw, Col. C. B., Indianapolis. Group 83.
 Vogt, A. S., Pennsylvania. Groups 80, 81, 82, 84.
 Wall, E. B., Illinois. Groups 81, 82, 84.
 Williams, L. W., Oak Cliff, Tex. Group 83.
 Atwood, W. H., Illinois. Group 83.
 Sooy Smith, Wm., Illinois. Groups 80, 81, 82, 84.
 Thurston, Prof., New York. Group 83.
 Hamer, Dr., Colorado. Groups 80, 81, 82, 84.
 Carpenter, Prof. R. C., New York. Groups 80, 81, 82, 84.
 Little, Lieut. McCarty, United States Navy. Groups 85, 86.
 Wolff, Alfred R., New York. Groups 80, 81, 82, 84.

A.

Ajax Metal Company, Philadelphia, anti-friction journal bearing.
 Adams & Westlake, Chicago, washstands, coolers, lanterns, lamps, headlights, trimmings, switch and locks.
 Allen Paper Car Wheel Company, Chicago, paper center wheel.
 American Balanced Slide Valve Company, San Francisco, balanced slide valve.
 American Brake Co., St. Louis, brakes.
 Arms Palace Car Company, Chicago, horse car.
 Ashton Valve Company, Boston, pop safety valve.
 F. C. Austin Manufacturing Company, Chicago, grader, ditcher and wagon loader.

B.

Baldwin Locomotive Works, Philadelphia, compound express, passenger locomotives, representative exhibit of locomotives, locomotive (consolidation type).
 Baltimore & Ohio Railroad Company, Baltimore, painting of first railway train, photographs and drawings of railway development; drawings, photographs and models showing development of the locomotive, photographs of scenery on the Baltimore & Ohio Railroad, photographs and drawings showing evolution of power-brake.
 J. N. Barr, Milwaukee, wheel grinder, contracting chill.
 Bass Foundry & Machine Company, Ft. Wayne, chilled car wheels.
 Bethlehem Iron Company, South Bethlehem, steel billets and rails submitted to tests.
 F. W. Bird & Son, East Walpole, waterproof fabrics.
 Bogue & Mills Manufacturing Company, Chicago, street and crossing guards.
 Boies Steel Wheel Company, Scranton, steel car wheel.
 Boston & Lockport Block Company, Boston, wooden and steel blocks for railroad use.
 E. J. Brooks, New York, car seals.
 Brooks Locomotive Works, Dunkirk, collection of locomotives; "suburban" passenger locomotives.
 Bucyrus Steam Shovel Dredge Company, Milwaukee, elevator dredge buckets, steam shovels.
 Burnham & Duggan Railroad Appliance Company, Boston, switch.
 Burrows Car Shade Company, Portland, car shade.
 Burton Stock Car Company, Chicago, sixteen stalled cars.

C.

Canada Cattle Car Company, Chicago, cattle car.
 Carlisle Manufacturing Company, Carlisle, frogs, switches and crossings.
 George L. Chatfield, Chicago, Ellis patent bumping post.
 Chicago Car Seal & Manufacturing Company, Chicago, car seal.
 Chicago, Milwaukee & St. Paul Railway Company, Chicago, light and heat tender.

A. H. Clark & Co., Chicago, automatic piston packing.
 E. Warren Clark, Rockford, locomotive, the General.
 Coal Muffler & Safety Valve Company, Baltimore, combined pop safety valve and muffler.
 Consolidated Car Heating Company, Albany, improved commingler system, direct steam heating, multiple circuit drum system and Sewell coupler.
 W. H. Cooper & Co., Chicago, metallic weather strip.

D.

Deere & Co., Moline, grader plows.
 George Dehaven, Grand Rapids, collection of railway tickets, passes, etc.
 George A. Deitz, Olden, seal lock and car door fastener.
 Detroit Bridge & Iron Works, Detroit, locomotive turntables.
 Drexel Railroad Supply Company, Chicago, pressed steel specialties, Barr vestibule.

E.

Eastman Heater Company, Boston, heater and ventilator car, refrigerator car.
 Ensign Manufacturing Company, Huntington, drawbar attachment.

F.

B. C. Fernow, chief of Forestry Department, drawings, models and specimens of cross ties.
 Clark Fisher, Trenton, rail joint.
 Fox Solid Pressed Steel Company, Chicago, flat car.
 A. French Spring Company, Pittsburgh, locomotive and car springs.
 Frost Veneer Seating Company, New York, veneer goods.

G.

General Electric Company, New York, electric locomotives.
 Gold Car Heating Company, Chicago, system of car heating.
 Gordon & Hamilton, Concord, automatic side door latches.
 Griffin Wheel & Foundry Company, Chicago, chilled iron car wheels.

H.

Hale & Kilburn Manufacturing Company, Philadelphia, car seats.
 Harlan & Hollingsworth, Wilmington, official car for Argentine Republic.
 Harvey Steel Car Works, Chicago, steel tank car.
 Herman Heinze, Chicago, map of the World's Columbian Exposition.
 Hicks Stock Car Company, Chicago, stock car.
 C. W. Hunt & Co., New York, industrial railroad system and conveyor.
 C. B. Hutchins & Son, Detroit, car roof.
 Hutchins Refrigerator Car Company, Chicago, refrigerator car.

I. J.

Industrial Works, Bay City, railway appliances, electric transfer table and steam crane.
 C. C. Jerome, Chicago, metallic packing.
 Jewett Supply Company, Boston, anti-friction device for passenger cars.
 Johnson Railroad Signal Company, Rahway, signals, switches and appliances.
 Jones Car Construction Company, Chicago, nut locks.

K.

Kalamazoo Railroad Velocipede Company, Kalamazoo, light special cars and velocipedes.
 Kelle Printing Company, New York, ticket, ticket seller and canceling apparatus.
 Mrs. Caroline B. Kelley, Chicago, decorated ceiling for railway cars.
 Kilbourne & Jacobs Manufacturing Company, Columbus, barrels, trucks, grading plows and scrapers.
 Charles B. King, Detroit, pneumatic calking tool.
 Krebsiel Palace Car Company, Cleveland, parlor chair and sleeping berth.

L.

L. S. & M. R. R. Co., Cleveland, railroad post-office car.
 Leslie Bros. Manufacturing Company, Paterson, rotary snow plow.
 Lima Locomotive Works, Lima, Shay locomotive.
 Link Belt Machinery Company, Chicago, elevating and conveying machinery.
 Live Poultry Transportation Company, Chicago, live poultry car.

M.

Marion Steam Shovel Company, Marion, steam shovel and yard dredge, machinery, ballast unloader.
 Mason Air-Brake & Signal Company, Chicago, automatic train signal.
 Mather Stock Car Company, Chicago, stock car.
 Merchants' Dispatch Transportation Co., New York, refrigerator car.
 McGuire Manufacturing Company, Chicago, grain door.
 McKee Fuller Company, Catawissa, car wheels.
 Michigan Railway Supply Company, Detroit, brakebeams.
 Moore Car Door Company, Chicago, freight car door fixtures.
 George S. Morison, Chicago, model of Memphis bridge.
 Morris Box-lid Company, Pittsburgh, steel journal box-lids.

N.

Nathan Manufacturing Company, New York, injectors, lubricators and appliances.
 National Hollow Brake Beam Company, Chicago, metal brake-beam.
 New Jersey Steel & Iron Company, Trenton, drawbridge, turntable, chains.
 New York Air Brake Company, New York, airbrake.
 N. Y. C. H. R. R. R., New York, buffet car and day coach, model of old engine and train, locomotive 999.
 Northern Pacific Railroad Company, St. Paul, exhibit car.
 A. O. Norton, Boston, lifting jacks.

O.

Old Colony R. R. Co., Boston, Mass., passenger locomotive historical exhibit.

P.

Paige Car Wheel Company, Cleveland, car and engine truck wheels.
 Cassius C. Palmer, Englewood, fruit refrigerator car.
 Pennsylvania Railroad Company, Philadelphia, refrigerator car, general exhibit: gun cars, passenger car, track inspection cars, laboratory.

Pittsburgh Locomotive Works, Pittsburgh, exhibit of locomotives.

Pneumatic Gate Company, Chicago, pneumatic railroad gate.

H. K. Porter, Pittsburgh, light locomotives.

A. B. Pullman Company, Chicago, freight car door.

Pullman Palace Car Company, Chicago, solid vestibule trains, vestibule postal car.

R.

Railroad Supply Foundry Company, Chicago, cast iron ventillator for roundhouses.

Ramapo Wheel & Foundry Company, Ramapo, boltless steel tired wheels.

Rand, McNally & Co., Chicago, tickets, ticket office appliances, maps, etc.

T. L. Rankin, Sackett's Harbor, ice railway.

Rhode Island Locomotive Works, Providence, three locomotives.

Roberts, Throp & Co., Three Rivers, combination hand and push car.

S.

Safety Car Heating and Lighting Company, New York, Pintech gas system, steam and hot water heating, Gibbs coupler.

Sargent Company, Chicago, brake shoe.

Scarlett Furniture Company, St. Louis, car seats.

Schenectady Locomotive Works, Schenectady, switch engine, two locomotives.

Schoen Manufacturing Company, Pittsburgh, pressed steel sundries.

Schuttler Manufacturing Company, Chicago, ratchet drills.

Self-Winding Clock Company, New York, train dispatcher or programme clock.

Sheffield Car Company, Three Rivers, light cars, velocipedes and standpipe.

C. T. Smith, Chicago, locomotive fire kindler.

Smith Pneumatic Transfer & Storage Company, Chicago, pneumatic machinery for conveying grain.

Standard Steel Works, Philadelphia, manufacture of steel tirea.

J. H. Sternberg & Son, Reading, iron track bolts.

Streeter-Amet Weighing & Recording Company, Chicago weighing machine.

Street Western Stable Car Company, Chicago, stable car.

T.

Taylor Iron & Steel Company, High Bridge, manganese steel wheels, steel-tired wheels.

Thatcher Car Construction Company, New York, compressed-air dumping car.

B. E. Tilden Company, Chicago, wrecking frogs.

M. D. Transportation Company, New York, refrigerator car.

U.

United States Car Company, Chicago, locomotive and car axles, refrigerator car.

United States Metallic Packing Company, Philadelphia, metallic packing.

United States Wind Engine & Pump Company, Batavia, railway wind pumps.

V.

Verona Tool Works, Pittsburgh, track and mining tools.

Vulcan Iron Works, Toledo, steam shovel.

W.

Wagner Palace Car Company, Buffalo, vestibule train model of car framing.

Wakefield Raftan Company, Chicago, railway car seats.

Webster Manufacturing Company, Chicago, power grain shovel.

Western Wheeled Scraper Company, Aurora, barrows, scrapers, road plows and road machines.

Westinghouse Air-Brake Company, Pittsburgh, air-brakes and train signaling apparatus.

Harris A. Wheeler, Chicago, railway car seats.

Benjamin Wohlhauser, Chicago, automatic air-brake, pressure regulator.

Henry R. Worthington, New York, tank pump and boilers.

Y.

Yale & Towne Manufacturing Company, Stamford, locomotive crane.

GREAT BRITAIN.

Midland Railway Company, Leverett & Ramsay, John Brown, Engineering Publishing Company, Sir John Fowler and Sir Benjamin Baker, Great Western Railway, London & North-western Railway Company.

NEW SOUTH WALES.

New South Wales Commission, Arthur Latimer McCredie.

AUSTRIA.

United Association for Advancing Travel in Tyrol, E. L. Grieselich, E. Skoda, Austrian Railroad Exhibition, F. Ringhofer, Josef H. Oesterreicher.

RUSSIA.

P. P. Rizzony, Russian Ministry of Ways and Communications.

ITALY.

Ulridge Hoepli.

GERMANY.

George Mary Mining Company, Grand Duchy of Baden Railroads, Royal Bavarian Railroads, Louis Wertheim, Deutsche Oesterreichische Mannesmann Rohr-Werke, F. Schichau, Siemens & Halske, Union Aktiengesellschaft für Bergbau, Eisen und Stahl Industrie, Van der Zypen & Charlier, Robert Latowski, Breslauer Aktiengesellschaft für Eisenbahnwagenbau, Royal Prussian State Railroad Administration, Heneschel & Son, Mark Judel & Co., Hugo Haushalter, Fr. Krupp.

SWEDEN.

Jernkontoret.

URUGUAY.

Ministry of Public Works.

JAPAN.

Japanese Commission.

CANADA.

Canadian Pacific Railroad, Noah L. Piper & Son.

VENEZUELA.

Venezuelan government.

BRAZIL.

Brazilian government.



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EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The people of Bayonne, N. J., are again complaining to the courts about the annoyance inflicted upon them by the excessive whistling of the locomotives of the Central Railroad of New Jersey, and application has been made to Vice-Chancellor Van Fleet, at Jersey City, for an injunction. The complainants allege not only constant disturbance of conversation, and any other business or pleasure requiring quiet, but also injury to health by lack of necessary sleep at night. Evidence is presented that the blasts of the whistles average one a minute all night. Whether this statement of the average is too high or too low, it is to be hoped that the complainants will carry their point, for there is absolutely no reason for tolerating noisy signals in thickly settled places. The fact that some roads get along without whistles—except when a person is liable to be run over—in the busiest yards and under the most adverse conditions, is almost proof positive that other roads can do the same. Moreover, certain superintendents have practically abolished the whistle nuisance within limited territories, and they are just the men who most thoroughly appreciate the benefit of the change, and are the strongest advocates of the enforcement of the rule prohibiting whistling. It is gratifying to see that the New Jersey Vice-Chancellor has taken a rational method of considering the question before him. He has appointed Mr. J. H. Brooks, formerly Master Mechanic of the New York Division of the Pennsylvania road, to report how much whistling is actually necessary. A railroad man of experience and of judicial temper is the proper sort of expert to decide such a question, and one coming from the Pennsylvania, on whose lines may be seen some of the best discipline in this department, is likely to decide justly. We do not mean to say that judges who themselves decide such questions lack the qualification necessary to rightly estimate the evils or annoyances due to whistling; but they are, in many cases, we think, liable to give too much weight to the remonstrances or excuses of railroad superintendents who think, or pretend to think, that they cannot abate the whistling without lessening the security against accident.

The best way to reduce unnecessary whistling would be a good topic for the Superintendents' Society to discuss. The fall meeting has just passed, but we mention the matter now in the hope that the members will have got so much benefit from the meeting that they will be in the mood to paste new topics in their hats for future use. The Standard Code rule on the use of whistles (No. 66) is one of those which had to be made rather vague in order to secure its adoption. The substance of it is, Do not make outrageous noise unless you think the rules require it. This leaves the whole matter to the engineman's discretion; and the education of this discretion is a part of the superintendent's work if he undertakes improvement. We do not recommend discussion in the hope of improv-

ing the Standard Code rule (although the Association would find no fault if any road should conclude to forbid the use of anything but flags, lights, bells and mouth whistles by trainmen in yardwork and should amend this rule accordingly); but rather to suggest comparison of experiences in the local application of the general rule. Local application of strict rules will be the principal part of the duty of the superintendent in this matter for a long time to come, for in thinly settled districts, which every railroad traverses, the majority of the people probably like the squealing of the iron horse "for company," and the enginemen can hardly be expected to deny them this comfort, even if the noise does disturb a few sensitive people who live near the railroad. At any rate a superintendent tackling the problem for the first time will have his hands full for a while to enforce decent treatment of the residents near the railroad in cities, let alone the country. But, as we intimated in discussing the Bayonne people's complaint a year ago (Sept. 28, 1892), the provision of suitable fences, gates and electric bells, so that attendants can give suitable warning before trains arrive, is the most obvious necessity in the majority of cases where whistling has become a nuisance; when these have been furnished, the uselessness of the whistling becomes self-evident, and enforcement of rules is comparatively easy even with the most noise-loving enginemen.

The Grade Crossing and the Electric Railroad.

The competition of electric railroads, actual and prospective, is one of the serious matters now before the minds of owners and managers of railroad property. This is especially true where a railroad has an important revenue from inter-urban or suburban business. One of the most remarkable examples of the possible results of this competition is seen in the complete wiping out of the "short line" traffic of the railroads between St. Paul and Minneapolis, where a very profitable business has been transferred entirely from the steam railroads to the electric inter-urban railroad. In New Jersey the establishment of electric railroads to carry passengers to the Hudson River ferries and to transport them from place to place in the populous zone lying within a circle of, say, 25 miles from New York City is a source of great uneasiness. It will not be long before the effect of these railroads will begin to be felt in the earnings of the steam railroads, as it is already seen in their plans for future development.

These are but two examples of a great movement. At the beginning of this year there were reported as in operation in the United States 5,939 miles of electric railroad track, a gain of 46 per cent. in the year. This, it must be noted, is miles of track, and not miles of line. The best authority at our command estimates that from 10 to 12 per cent. of all electric railroad is single track; thus we get 3,300 miles as the approximate length of electric railroad in the United States, Jan. 1, 1893. This has all been built within about six years. We have no estimate of the addition to this mileage that will be made in 1893; but even leaving out of consideration the famous St. Louis-Chicago 100-miles-an-hour myth, it must be important. With all the mistakes that have entered into the development of this new mode of transportation there are at the bottom some great, substantial facts, and that man is foolish who thinks, or pretends to think, that the electric railroads are not a serious factor in competition. Their competition is found not only in actual traffic, but in the money markets, where both interests must go for loans with which to build new lines and to improve old ones.

Hence the railroad manager of foresight, whose lines lie in the territory that is most likely to be tempting to projectors of electric railroads, is bound to watch events with great care. All of this is suggested by certain words from Mr. Charles P. Clark, President of the New York, New Haven & Hartford Railroad Company, in the report which will be submitted to the stockholders of that company at their annual meeting next week. We quote what he has to say especially on this subject.

"The rapid application of electricity as a motive power upon the highways naturally brings the attention of railroad managers to the competition thereby created with existing steam roads. The demands of the public upon steam railroads for expensive stations, prompt and frequent train service and protection by gates and flagmen at grade crossings, in competition with the free right of way and cheaper construction of electric roads, may be unjust; and the new motor will at first diminish to an appreciable extent the earnings of steam railroads from local travel. An ultimate advantage by the development of local centers and of suburban properties may be anticipated, but meanwhile the owners of steam railroads may reasonably expect their managers to lessen local service in proportion to diminished business."

"Independent of any consideration of gain or loss the duty remains to protect the public against the new danger created by these electric roads at railroad crossings. Accidents will be caused by the electric car be-

coming disabled by loss of contact with the current and remaining helpless on the crossing. If the public exigency requires these roads to cross steam roads, it should first compel a separation of grades under the operation of law."

These are words of wisdom. It is not sensible to stick one's head in the sand and play that the pursuer is baffled, nor is captious opposition sensible, such as tearing up tracks, cutting trolley wires, or running locomotives and freight cars on crossings. That sort of fooling earns the public contempt and incites public opposition, and plays directly into the hand of the enterprising competitors. The grave question of safety to both classes of traffic, however, is not only a legitimate one to be raised, but it is one that is just as inevitable as the coming of the electric railroad itself. The elimination of grade crossings is one of the steps in the evolution of the railroad system that must be taken sooner or later wherever railroads are built. How soon it is taken is merely a question of local conditions. Grade crossings of highways, of street railroads and of standard railroads must be permitted up to the point where the cost of avoiding them ceases to be such a burden as to restrict railroad building beyond proper public needs, but all these grade crossings will disappear as population increases and as traffic of all kinds grows in density. But electric railroads will generally be built in those parts of the country which have already reached the stage of development which justifies restrictions on railroad crossings at grade; and that the building of these railroads and of cable railroads introduces a new and very grave danger is apparent to anybody who will take the trouble to watch the monthly reports of railroad accidents. It follows that now, almost at the beginning of the building of what is bound to be a vast system of electric and cable railroads, is the time to institute proper public control of crossings.

The case of the New York, New Haven & Hartford Railroad is a peculiarly interesting one, for this company has spent and is spending many hundreds of thousands of dollars for the purpose of increasing the public convenience. We do not say that the company is doing this as a philanthropic enterprise, for of course it expects some time or other to earn interest in some way or other, on the money spent in wiping out grade crossings on its line between New York and Boston. But that interest will not be earned by reduction in operating expenses or by any other economy; it will be earned through the advantages which will by and by come to the company because of the better and safer service that it can render to the public from the fact that its lines are freed from those crossings which have imperiled life and restricted speed. Considering therefore the amount of expenditure that the company has made for this purpose, and, considering what the purpose is, its officers are not only justified in fighting for separation of the grades of the railroads of all classes which are hereafter to cross their lines; but it is their duty to their stockholders and to the public to make this fight.

Furthermore, that kind of opposition will probably restrict but very little the legitimate development of such electric railroads as are likely to be of public utility in the territory traversed by this railroad, for a franchise for a new electric railroad will be just about as readily sold and financed if it is burdened with the obligation to build its line over or under the grade of the steam railroad. This is true at least in the populous parts of the Eastern States; it might be an onerous limitation in more thinly settled regions, that is to say, in those regions in which an electric railroad is not likely to be built. The additional expense of the construction of an electric railroad which follows from a separation of grades is not nearly so serious a matter as it is with a standard steam railroad, for the rolling stock being lighter and the speeds lower, the structure itself need not be so substantial and the charge on operating expenses, due to carrying the traffic up and down grades, is not so serious an item.

But, if for any reason it is decided that a new electric railroad may cross an existing steam railroad at grade, the crossing ought at least to be protected by interlocked signals, and the cost of putting in these signals, and of maintaining and operating them, should be divided between the companies using the crossing, on a fair basis. If this condition is insisted upon it will probably be found that the demands for the privilege of crossing at grade will be considerably reduced, for the company building the new road will, if it has proper engineering advice, be very likely to avoid loading its operating charges with the cost of maintaining and operating signals at crossings, and will seek to gain the additional advantage of unrestricted speed at such crossings by a moderate addition to fixed charges.

There is one point in the consideration of this subject which we have not seen brought up, viz., that the

danger is greater at the crossing of an electric railroad by a steam railroad than at the crossing of two steam roads, from the fact that the number of trains on the electric road is much greater than on the steam road when the same number of passengers is carried. Thus there are more chances that the signalman will make a mistake and more chances of finding a train on the crossing.

Private Tracks at the Carrier's Expense.

We recently referred (Sept. 22) to the decision of the Supreme Court of Minnesota, Judge Vanderburgh delivering the opinion of the Court, on the complaint made by certain grain shippers that the Minneapolis, St. Paul & Sault Ste. Marie did not properly accommodate them in the construction of side tracks adjacent to their shipping warehouses close to the railroad grounds and stations. The full text of the opinion, since received, places the decision on the broad ground that the railroad must treat all shippers alike, and finds in the particular case then under view that an unjust discrimination had been made against the Farwell Farmers' Warehouse Association, which was the complainant in the case.

The case arose under the State Railroad and Warehouse Commission Act of Minnesota. It appeared that the Farwell Association had applied to the road for a site upon its right of way on which to put up a grain warehouse from which grain was to be shipped, and the road refused. The warehousemen then bought land and erected their house about 55 ft. from the track, and asked the company to build a side-track to it. (The track could lie wholly on railroad ground). This also was refused. They thereupon applied to the State Commission, which ordered the railroad to build the side-track. This order was subsequently affirmed by the Supreme Court of the State.

We do not at the moment recall a case where a Court has gone so far, upon a complaint of this character, as to require a railroad to build a new track to accommodate the sole business of a private shipper, and we may well pause to consider whether such a direction is either competent or advisable for the courts to give. Of course the power of the Court in Minnesota is settled by the decision for that state. But it is by no means certain that if the Federal question were to be raised and the case transferred to the Supreme Court of the United States the same view would be upheld.

It has been held by enlightened legislators and jurists that, however large may be the powers of supervision committed to the courts and railroad commissions, they do not and should not extend to the point of divesting the railroads of the undivided responsibility of operating their lines. As was well said in the Report of the Royal Commission to the British Parliament in 1877, referring to the proposition to transcend this policy: "A government authority placed in such a position would be exposed to the danger either of appearing indirectly to guarantee works, appliances, and arrangements which might practically prove faulty or insufficient, or else of interfering with railway management to an extent which would soon alienate from it public sympathy and confidence, and thus destroy its moral influence, and with it its capacity for usefulness." It seems to us to be crossing the danger line when the Court goes so far as to order a railroad company to construct a track for the sole accommodation of any private shipper.

In this case the shipper first applied for a site on the right of way of the railroad, on the ground that other shippers occupied sites on the right of way elsewhere. It is apparent that such a request might be most reasonably refused, because no such site was at the time available for the purpose, having reference to the business of the company, its shipping stations, its scheme of track construction, freight facilities and other contingencies which may have been in contemplation for the best welfare of the company and the public. Indeed this refusal was so far justified that the shipper abandoned the point, built his warehouses on his own land and then asked for a special track to accommodate his business, on the ground that he would thereby be saved the expense of carting his grain to the company's cars or freight house.

The Court seems to decide that because the shipper had a right to a site on the company's land he also had at the same time the right to make the company build him a private track, either of which rights the shipper might enforce at his election. But this does not follow. If we concede that the shipper had a right to a site, we should rather infer that he could not for that very reason select a site somewhere else and cause the company the unnecessary expense of extending its line to his warehouse, wherever it might be. If the company's right-of-way is to be absorbed or reserved

as building sites for shippers, without reference to the future needs or exigencies of the company, it would seem like "rubbing it in" to hold the company liable upon any shipper's request to run side tracks over that portion of its lands which has not been actually covered by some other shipper's structure.

The decision, we have seen, is based upon the ground that there should be no unjust discrimination, under the law, in shipping facilities. But the case does not disclose that other shippers had built upon their own lands and had the company run, at its own expense, private tracks to their warehouses. It does appear that other shippers had built upon the right-of-way and were using side tracks adjacent thereto. We think the complainant was fairly entitled to the same privilege, provided the available space of the company was not already absorbed and its business at that shipping station was large enough to justify larger and more expensive shipping facilities. But these are important provisions, and they might well have been inquired into and determined by the Court; then if there appeared to be an unjust discrimination against the complainant, he was entitled to have it corrected, not by making another unjust discrimination in his favor and against the company, but by requiring the company to treat him as it treated other shippers and give him a fair show. Instead of this the learned Court has said to the company, in effect: "Because you did not give the shipper in the first instance a site on your land to build on, as you have done to other shippers, you must now build for his special benefit a track to his door."

This is not a sound alternative, and, for aught that appears in the case, it punished the company not only in a way unauthorized by the law, but, in granting the shipper a most unusual and questionable relief, in a way expressly forbidden by law.

We are far from maintaining that a carrier should not be required to maintain suitable and equal facilities for the conduct of its business. But a distinction should be made between facilities which redound to the benefit of the public generally and those which are of advantage to one shipper alone. The construction of track from a main line to a shipper's door can hardly be ordered on the ground that all are entitled to equal facilities of shipment, unless we concede that every other shipper may have an order for such a track if he wants it. The doctrine of private tracks at the carrier's expense and without his consent, is salutary neither for the public nor the carrier.

New York-Chicago Passengers in August and September.

The statistics of passengers from New York to Chicago which have been published in the New York papers enable us to form some idea of the way this traffic has been moving. These figures have probably been given out, contrary to the wish of the majority of the trunk lines, by some traffic man who feels proud of his own showing in them, but although they thus lack official authentication, Commissioner Farmer gives the reporters enough general information to confirm their substantial correctness.*

He says, in substance, that the total number of passengers from New York City to Chicago in September was 32,000; in August, 21,500, and in September of last year 7,000. He estimates that 50 per cent. of last month's travel was carried on one-way tickets, at full rates; 25 per cent. on regular World's Fair excursion tickets (20 per cent. reduction), and 25 per cent. on the day car excursions at half fare. This shows that the sleeping car traffic alone must have been at least double its usual volume, and very probably was three or four times as large as usual; thus strongly justifying the railroads in not reducing the fare by the fast regular trains. The difficulties encountered by parties desiring to engage special sleeping cars have further shown how fully these cars have been kept in use. Although the travel has, of course, been heavy all the time eastward as well as westward, it appears that the roads have not been able to avoid hauling a good many cars empty, owing to the irregularity of the demands of special parties.

The New York Central continues to lead. In August it took 57 per cent. of the full rate New York-Chicago passengers, and 28 per cent. of the full-rate and excursion together (6,094 passengers out of 21,457). The Erie has made the most noticeable gains, however, doing this largely by means of its day car excursions. It took 20 per cent. of the excursion business and came next to the New York Central in proportion of the total in August (3,172 passengers). In this total the Pennsylvania came third with 2,799, and the Baltimore & Ohio fourth with 2,303. The West Shore, Lackawanna, Lehigh Valley and Ontario followed in the order named.

* The statistics printed in our traffic column last week showed the traffic to Chicago only, and the "allotted percentage" column should have been omitted, as that refers to the passenger traffic from New York to all points beyond trunk line termini.

For September the percentages have been published only for the day car (half rate) excursions. These are:

	September Passengers. Per ct.	July 21 to Sept. 30 Passengers. Per ct.
N. Y., L. E. & W.	2,445 30.6	3,733 24.6
N. Y. & W.	1,047 13.1	2,309 15.2
West Shore	834 10.4	1,685 11.1
Lehigh Valley	845 10.5	1,632 10.8
D. L. & W.	596 7.5	1,538 10.1
N. Y. C.	610 7.6	1,510 10.
B. & O.	779 9.8	1,460 9.6
Pennsylvania.	835 10.5	1,396 8.6
Total.	7,991 100.0	15,173 100.0

In October the Pennsylvania will probably take a much larger share, as it has reduced its rate 10 per cent. It is not very clear just why that road should have needed this \$2 differential to draw a satisfactory share of the business. We have not heard that its facilities or its well known advantages have been lessened. At all events, we must conclude that the New York Central and the Erie are keeping all their passenger cars constantly running and well filled, else they would not so quickly acquiesce in this arrangement.

The day car excursion trains have invariably left the trunk lines' Western termini with from three to six times as many passengers as they carried out of New York City. If the other traffic from the interior of New York and Pennsylvania has been in similar proportion to the New York City business—and it seems reasonable to suppose that it has—the increase in total passenger earnings of the roads interested must come up to something like the pleasant figures shown by the Pennsylvania in 1876, though nothing but the actual reports will afford a basis for any definite estimate. That New York City is not the only source of traffic is brought to mind by a statement in a Philadelphia paper concerning the World's Fair traffic from that city, based on figures given out by General Passenger Agent Hancock, of the Philadelphia & Reading. From May to Oct. 1 this road took from Philadelphia to Chicago 10,950 passengers, and from other points in Pennsylvania 3,650.

Traffic of Boston Railroads.

The year that ended on the 30th of last June was a prosperous one with the Boston railroads. Both passenger and freight traffic increased largely in volume, and, with a single exception, the financial result of each class surpassed that of the preceding year. The passenger traffic of the five standard gauge roads increased 6.85 per cent., while the freight traffic showed a gain of 8.7 per cent.

The total number of passengers carried was over 91,000,000, while the passenger-mileage was 1,227,602,300 and at least one-half of the total number of passengers comprised those living within a dozen miles of Boston, while half of these reside within five miles.

The Boston & Maine, with practically three distinct roads, carried the largest number of passengers, 36,247,601, and it also made the largest per cent. of increase, 8.33. The Old Colony, with two roads, carried 25,222,836 people, but its increase was only 5.66 per cent. The Boston & Albany transported 12,711,551 passengers, and its 8.12 per cent. of increase was next to the Maine's. The Fitchburg road carried the smallest number of passengers, 7,770,832, but its average haul was next to the Albany's, being 15.17 miles. The passenger traffic to and from Boston was about three-fifths of the entire passenger business of the five companies.

As the readers of the *Railroad Gazette* are aware, the Boston & Maine is building a great union depot in which all three of its Boston lines, together with the Fitchburg road, are to be accommodated. Part of the station is to be ready for occupancy in a few weeks, but it will not be fully completed before next summer's business begins. Although it is to have some 22 tracks beneath its roof, it appears already that the accommodations of the new station will not be much larger than will be needed almost as soon as they will be available. There will be nearly 600 trains daily entering or departing from the station, and the four roads that will use it this year carried in and out of Boston over 28,000,000 passengers, or an average of nearly 80,000 each day. The traffic increased this year over 5 per cent., and, should an equal gain be made the coming year, some 30,000,000 will use the new station the first 12 months.

The following table will show in convenient form the statistics of the passenger business of the Boston roads:

PASSENGER TRAFFIC, BOSTON RAILROADS, 1893.

	Passen- gers.	Per cent. in- crease.	Passenger miles.	Average miles per passenger.	To and from Boston.	Per cent. increase.
Boston & Albany	12,711,551	8.12	229,115,445	18.00	7,724,994	6.81
Boston & Maine	36,247,601	8.33	469,325,316	12.95	23,669,045	5.16
Fitchburg	7,770,832	5.84	117,908,668	15.17	4,943,195	3.51
N. Y. & N. Eng.	9,124,510	4.15	105,460,990	11.36	3,769,662	3.72
Old Colony	25,222,836	5.66	303,791,781	12.94	14,752,222	3.89
Totals.	91,077,130	6.85	1,227,602,300	13.48	54,201,118	4.33
Boston, Revere Beach & Lynn.	2,837,499	9.38	15,525,507	5.47	2,380,423	4.84
Totals.	93,914,629	6.35	1,243,127,807	13.32	56,581,541	4.48

*Decrease.

Of late years the passenger business of the roads has grown so much that many persons have an idea that the freight traffic has not amounted to much. While

compared with many of the big roads of other regions this is true, still the freight business of the Boston roads is actually greater in financial returns than the passenger business and is steadily increasing, amounting the past year to 25,000,000 tons. The freight business of the several roads may be easily compared by the accompanying table:

FREIGHT TRAFFIC, BOSTON RAILROADS, 1893.

	Tons of freight.	Per cent. increase.	Ton-miles.	Average miles per ton.
Boston & Albany....	4,514,085	6.05	485,415,100	107.57
Boston & Maine....	8,063,169	11.78	519,236,621	64.38
Fitchburg.....	4,572,330	6.65	525,027,360	107.75
New York & New England.....	3,549,006	8.43	339,694,348	97.12
Old Colony.....	4,024,087	8.51	127,932,402	31.76
Totals.....	25,024,987	.....	1,997,305,881	.....

The total earnings, and earnings per mile, of road may be compared by this table, and the differences will be found interesting. The Boston & Albany leads, it will be seen, in earnings per mile in each class, and the New York & New England is the lowest in the total per mile and in passenger earnings per mile, but in freight per mile it is in the exact middle of the group:

TOTAL EARNINGS, AND EARNINGS PER MILE, BOSTON RAILROADS.

	Passenger earnings.		Freight earnings.		Pass. and freight earnings.	
	Total.	Per mile of road.	Total.	Per mile of road.	Total.	Per mile of road.
Boston & Alb'ny	\$4,205,174.60	\$10,817.72	\$1,895,552.92	\$12,575.18	\$9,090,727.52	\$23,392.90
Boston & Maine	8,467,143.36	7,142.06	7,989,851.59	6,175.90	16,456,994.95	13,317.96
Fitchburg.....	2,204,581.93	4,895.59	4,925,723.53	10,960.48	7,140,365.46	15,856.07
New York & New England.....	2,120,224.03	4,462.01	3,805,674.61	7,141.92	5,925,896.64	11,603.96
Old Colony.....	5,451,228.55	9,535.00	3,437,244.21	5.6.6.61	8,889,052.76	15,191.61
	\$22,448,352.47	.....	\$25,054,626.86	.....	\$17,502,979.33	.....

The comparisons of the traffic of these five Boston roads is especially interesting at this time from the fact that this is the last time that the figures showing the business of the Old Colony can be available, for, the New York, New Haven & Hartford having leased the Old Colony system, the latter's business will hereafter be included in the returns of the consolidated road. By agreement when the latter leased the Old Colony, the accounts were to be kept separate until the end of the railroad year, and hence the 30th of last June was the end of the Old Colony as a separate system.

Annual Reports.

Chesapeake & Ohio.—The economic results of the liberal and judicious expenditures that have been made for the last four years in improving the physical condition of the Chesapeake & Ohio Railroad are now quite apparent. Notwithstanding the fact that so large percentage of the freight tonnage of that road is coal, which under the stress of severe competition must be carried at very low rates, the favorable grades and the good equipment enable the operating officers to show constantly improving earnings. The chief results of operation for the last fiscal year to June 30, 1893, follow:

Average mileage operated..... 1,192.5 Inc. p.c.

Beyond this, 84½ miles between Orange and Washington has been operated for three years under trackage agreement.

Inc. p.c.

Gross earnings.....	\$10,336,510	11.8
Operating expenses, maintenance and taxes	7,132,761	6.
Net earnings.....	3,204,050	41.
Interest on funded debt and other charges	2,708,290	47.
Surplus	423,760	8.

For four years the operating expenses, maintenance and taxes have been 78 per cent., 75 per cent., 75 per cent. and 69 per cent. of the gross earnings, the lowest ratio having been reached in 1893. The ton-miles hauled in the last year were 1,479 million, an increase of nine per cent., and the passenger miles 118½ million, an increase of 12 per cent. Nevertheless, the cost of conducting transportation fell slightly, having been in the last year \$3,034,820 against \$3,046,016 in the preceding year. The items of maintenance of way and maintenance of equipment also fell, the former 19 per cent. and the latter four. These were the chief savings of the year. As must be expected under the increase of work done, the wages and fuel account increased. The items under the head of conducting transportation in which a saving is shown are car mileage, damage to property, injuries to individuals, oil and waste for locomotives, stock killed and injured, and wrecking. These amount to over \$100,000 and more than offset the increase in the other items of this account. About \$65,000 was saved in the one item of the cost of accidents.

The increase in freight train load is remarkable, namely from 250 to 283 tons; so that while the ton-mile rate fell from .536 per cent. to .511, the earnings per freight train-mile increased from \$1.38 to \$1.44. It will be interesting to compare this average train load with that of a few other railroads: New York Central, 1893, 287 tons; Pennsylvania Railroad, 1892, 220 tons; Erie and N.Y., P. & O., 1892, 232 tons; Baltimore & Ohio, 1892 (east of the Ohio River), 121 tons; Norfolk & West-

ern, 1892, 198 tons. These figures illustrate the physical advantages which this road enjoys from having reduced its grades to a maximum of 30 ft. to the mile, eastbound, over the Allegheny Mountains. A continuous low grade line from Cincinnati to Newport News was established by the acquisition in 1889 of the Richmond & Allegheny Railroad, now the James River Division, and this was followed by improvements in a permanent way, structures and equipment, amounting to a thorough reconstruction of the road. Everything that could be earned in excess of fixed charges was put into improvements. This expenditure has been reduced in the last year, but even in this year operating expenses have been charged with about \$300,000 spent for new equipment, strengthening bridges and viaducts, filling trestles and other like improvements. The President says that for the first time in the history of the property it has earned something on its common stock, which he thinks the stockholders will find encouraging for the future.

We find from the General Manager's report that while the freight train mileage decreased 0.4 of one per cent., the loaded freight car mileage increased 5.3 per cent. The coal loaded at the mines was over 3,000,000 tons, an increase of 26.9 per cent.; that dumped at Newport News was 1,056,000 tons, an increase of 41 per cent.; that delivered to the Cincinnati and Lexington divisions was 765,000 tons, an increase of 32.3 per cent. The increase in freight, including coal and coke, was 3.8 per cent., but the revenue from all freight other than coal fell off 4.6 per cent., while the revenue from the coal traffic increased 21.9. The passenger revenue increased 9.9 per cent., while the passengers carried increased 5.2 per cent.

The cost of road and equipment, June 30, 1892, was \$119,000,000. The largest items in the increase are \$271,000 for arching tunnels, \$764,000 for new equipment, \$945,000 for the completion of certain new work, that is, yards, piers and station at Newport News, double track on the Huntington Division, and the Lynchburg freight station. Added to this are the items of \$230,000 for the construction of the Buckingham branch and \$158,000 for the purchase of additional securities of the Elizabethtown, Lexington & Big Sandy Railroad and construction on the Lexington & Big Sandy Division. These, with a few minor items, account for the increase in this account on the balance sheet.

New York, New Haven & Hartford.—The annual report for the year ending June 30, 1893, covers 830.82 miles operated, and that of the previous year covered 508.08; the company is now operating 1,493 miles. The difference in mileage being so great, a comparison of results would be useless without making it on a mileage basis. The principal results for the last year were: Gross earnings, \$18,113,474, of which more than \$9,807,000 was from passenger business and \$8,116,000 from freight. The operating expenses were 68.5 per cent. of the gross earnings, and the income from operation was \$5,707,540. Adding income from other sources, the total was \$5,917,554, which, after deducting taxes and fixed charges, left \$2,007,900 available for dividends, and 10 per cent. was paid on the capital stock, which increased materially during the year.

The financial operations of the road during the year have, as is well known, been very important. It was decided last December to issue debenture certificates, convertible after 10 years into capital stock of the company at par, and these were subscribed for to the amount of over 13 millions. Stocks of leased lines held in the company's treasury were converted into the company's stock, resulting in 13,323 shares being made available for the general purposes of the company. This stock was sold last January at slightly over \$255 a share and the proceeds, \$3,399,000 have been used for the improvement of the property. Finally, as is well known, the company has been authorized to increase its share capital to \$100,000,000, and the exchanges of Old Colony stock are now proceeding, about 33,000 shares having been exchanged at the date of the report. The entire stock of the New York, Providence & Boston has been converted into the stock of the "Consolidated." The balance sheet at the close of the fiscal year shows the cost of road and equipment as a little over \$40,600,000. The capital stock is nearly \$33,000,000 apart from \$3,282,000 subscribed to the convertible debenture certificates, and the funded debt is \$4,300,000.

The passenger-miles were 476,500,000, and the average receipts per passenger-mile 1.797 cents; the average journey was 20.55 miles; the passenger earnings per train-mile were \$1.54, and per mile of road they were \$11,365. The ton-miles were 419,000,000, and the average haul 61 miles. The receipts per ton per mile were 1.867 cents, and per train-mile \$2.13.

The President alludes briefly to the work that is done and that is now going on in four-tracking and in double-tracking. It is expected that the double track will be entirely completed between Boston and New York, by

way of the Shore Line, by next spring. An expenditure of not less than \$1,500,000 must be made for new terminals in the city of Providence. Work there has begun and will be prosecuted to completion, which will probably require two or three years.

New York, Ontario & Western.—The annual report to the end of June, 1893, shows the following as the principal result of operation: Miles operated, including leased lines and trackage rights, 477; gross earnings, \$3,688,174, increase over the preceding year 13 per cent.; operating expenses, \$2,607,783, increase 14 per cent.; net earnings, \$880,948, increase 11 per cent.; surplus, \$256,853, increase 10.7 per cent. The ratio of operating expenses and taxes to gross earnings was 76 per cent., and 75 for the previous year. The increase in operating expenses was distributed among all items. The increase in passenger earnings was nearly 9 per cent. and in freight a little over 10. The increase in freight other than coal was very small; the through freight having fallen off about \$8,000 and the local freight having increased about \$11,000. The increase in coal earnings, however, was \$310,000 or over 27 per cent. The growth in this item is, of course, to be attributed to the construction of the Scranton branch concerning which we wrote very fully at the time of its opening. The average earnings per ton per mile were slightly greater than last year; that is, .936 cent as compared with .939.

Of course the valuable coal traffic delivered to the line from its Scranton branch involved additional and heavier equipment, also improvements in the permanent way on the main line, with the result that the bonded debt increased from June 30, 1888, to June 30, 1893, from \$3,188,000 to \$12,100,000 outstanding, or \$8,912,000. A detailed table is given in the report of the expenditures from the proceeds of these bonds, the heaviest items in which are \$639,000 for locomotives, \$1,056,000 for gondola coal cars, \$144,000 for coal cars bought under trust agreement, \$300,000 for additional track; \$144,000 for bridges, trestles and culverts; over \$500,000 for improvements of the Weehawken, Oswego and Cornwall terminals, and \$284,000 for the Zigzag Tunnel. Much the greatest item, however, is \$6,095,826 as the cost of the Scranton Branch with the yards, terminals, breakers and mine branches. The purpose now is to limit further improvements as strictly as possible, but within the next three years several iron bridges must be renewed and a further small improvement must be made at the coal trestle at Weehawken.

Judge Taft, in the United States Circuit Court, at Grand Rapids, Mich., has sustained the Interstate Commerce Commission in declaring free cartage of freight by a railroad company illegal. The decision was rendered last Saturday. It is in the case of Mary O. Stone and Thomas Carten, of Ionia, Mich., against the Detroit, Grand Haven & Milwaukee, and the road was ordered by the Interstate Commerce Commission to discontinue the free cartage as long ago as April 26, 1890. The essence of the complaint was that freight from Eastern points was carried to Grand Rapids and to Ionia at the same rates, but at the former place, to which the distance was the longer, the freight was delivered free by wagon to the consignees' stores or places of business, the town being some distance from the station. Chairman Cooley wrote the opinion of the Commission, basing it chiefly upon the violation of the long and short haul clause of the interstate commerce law. Commissioners Morrison and Schoonmaker concurred with him, and in addition emphasized the point that the payment of this cartage, averaging two cents per 100 lbs., was substantially a rebate from the published tariff, and illegal, whether it discriminated against Ionia or not. Commissioner Bragg dissented, in an argument filling nine pages. It is difficult to see how any one can disagree with the majority of the Commissioners. As Judge Taft says, in sustaining their opinion, "cartage is as foreign to ordinary freight business as would be the free packing of goods for shipment." That is certainly true, in this country. If a railroad is to be permitted to do business by wagon at any desired distance from its right of way, it should be required to take out a charter permitting such business; and, what is more important, should be required to issue tariffs showing rates to the separate station which is thus in effect established. It is true that railroad projectors have a habit of procuring charters which permit them to do almost every kind of business imaginable, and it is also true that we cannot always justly say that a rate to one town shall be proportioned by the rate to a neighboring place; but if Government is to regulate freight rates at all, we may be pretty sure that the majority of any court will decide that this exclusion of a trucking department is a fair restraint. The establishment of a line of wagons may very fairly be considered as a device to avoid the building of a branch railroad; for, in fact, that is the only shape in which the question has come up in this country; railroads have not undertaken the business of delivering and collecting freight except at towns where a competing road's freight house was nearer the center of business. Every such competitor may justly claim that as it has been to special expense to build its line near to the center of business, the other road should not be permitted to share this advantage, except on the same terms. Judge

Severns dissents from Judge Taft's opinion, but his arguments are not given in the press despatches. Doubtless they are based on the opinion of Commissioner Bragg, who presented a bewildering array of arguments, only one or two of which, however, have any particular force. He says that, as incident to its business, a carrier has the right to cart goods to and from its depot. We do not see that he quotes any authority for this, however; we question the soundness of the view. He makes comparison with delivery of cars at private side tracks, but it seems to us that the essential condition of such delivery, that a track has actually to be laid, constitutes an important limitation which cannot be ignored. If such tracks are built without authority of law, or if railroads operate them when their charters do not permit it, it is well to consider whether the rights and the restrictions of the railroad in the premises should not be more clearly defined by statute. Commissioner Bragg seems to have been overborne by the fact that this practice of delivering freight free at Grand Rapids had been in vogue for about 25 years, before the construction of the Michigan Central and the Detroit, Lansing & Northern, the competing roads who instigated this complaint.

The Big Four, which, so far as concerns the question under consideration, may be said to include the Chesapeake & Ohio as well as the Cleveland, Cincinnati, Chicago & St. Louis, is taking grain from St. Louis to Liverpool for 26.8 cents per 100 lbs., and is thereby making considerable of a stir among its competitors. This rate is made, of course, in connection with the new Chesapeake & Ohio Steamship Line from Newport News. The regular rate from East St. Louis to Baltimore over the Ohio & Mississippi and the Baltimore & Ohio is 26 cents, and from Baltimore to Liverpool about 10 cents; so it is claimed that the Big Four must be seriously cutting the rate for the railroad part of the haul. We have seen no statement from any officer of this line. If we remember correctly the Chesapeake & Ohio has heretofore published its rates from Western points through to Liverpool, making no concealment of the fact that its own proportion on such a through rate was less than its published rate to the Atlantic seaboard. The distance from East St. Louis to Newport News via Indianapolis is 1,065 miles. If the steamships are allowed 10 cents, leaving 16.8 for the railroads, the latter receive 0.315 cent per ton per mile. This is less than half the average receipt for all freight, as shown in the Chesapeake & Ohio's last annual report. It may not be impossible to carry freight over this line at this rate, but when it is considered that most of the cars will probably be hauled West 1,000 miles empty we cannot estimate the profit at any extravagant figure. In addition to this complaint the Chesapeake & Ohio is also accused of buying grain in St. Louis to fill out shiploads. This is practically the same thing that the Baltimore & Ohio was accused of last year and the year before. The pith of the accusation was that favored grain dealers were notified beforehand of an intended future reduction of the tariff on corn from Nebraska to the Atlantic seaboard (if, indeed, they were not given a secret rebate); and that, therefore, these dealers were enabled to buy large quantities of corn quickly by paying two or three cents a bushel higher than anybody else could afford to give. It is to be presumed that no evidence of these earlier offenses was ever secured, as no complaint has been made to the Interstate Commerce Commission or to the courts.

The dangers of "fogging" constituted the subject of discussion in a meeting of one of the branches of the Amalgamated Society of Railroad Employees in London recently. For the benefit of readers not familiar with London fogs it may be explained that the term "fogging" refers to the occupation of track repair men when they are detailed to put torpedoes on the track at distant signals. On the busy English lines hundreds of men have to be assigned to this duty whenever a fog comes on. Each man is stationed close to a signal, and regulates the torpedoes in accordance with the position of the signal arm; when it is up the torpedo is kept on the rail, and when it is down the torpedo is taken off. The grievance of the men seems to be that they have to remain in dangerous proximity to the track during the passage of trains. Where there are two main tracks for trains in the same direction one man has to attend to two signals, and a case is mentioned where, in order to do this, he had to station himself in a pit 26 in. wide, 15 ft. long and from 1 ft. to 3½ ft. deep, the pit being located between two tracks. The point of the demand, so far as we can make out, is that there shall be a separate man for each signal. To an American the simplest remedy for this difficulty would seem to be the employment of a machine like the torpedo placer used on the Manhattan Elevated road in New York City, where many thousand operations have been performed without any cost whatever for attendants. Indeed, it appears that something of this kind is in use on the London & Northwestern, but none of the other English roads seem to have taken any action in that direction.

The Richmond & Danville has made a second reduction in wages. The first, a month ago, applied principally to salaries over \$100 a month; now 10 per cent. has been deducted from those between \$50 and \$100 a month. The employees of the Denver & Rio Grande, who have for weeks made a big fuss about the 10 per cent. re-

duction on that road, have finally accepted it by a large majority vote in their brotherhoods. Considerable violence by strikers has been reported during the past week. At Birmingham, Ala., five companies of state militia were called out to protect the property of the Louisville & Nashville at the Decatur shops. Reports of actual violence there are meagre, however, and it appears that the soldiers were withdrawn the next day. At Memphis, Tenn., the striking yardmen of the Memphis & Charleston threw stones at negro brakemen hired in their places. At Indianapolis, on the 4th, non-union boilermakers working at the shops of the Cleveland, Cincinnati, Chicago & St. Louis were attacked by a mob. A man, apparently an innocent passerby, was killed by a shot from a policeman's pistol, and Division Superintendent Riley was injured by a stone. On the Ohio Valley road in Kentucky a company of strikers drove some negro brakemen off from a freight train and took possession of the train.

The need of interlocked signals at railroad crossings as a protection to life and property has often been shown in a tragic manner, innumerable collisions having occurred under such circumstances that it was morally certain that suitable signals would have averted them; but this need is seldom more pathetically shown than it was at Catawissa, Pa., on the morning of Oct. 3. Near the station at that place the tracks of the Crane Iron Co. cross those of the Lehigh Valley Railroad, and a watchman, giving signals by target, has been stationed there for many years, the engineman of each road being unable to see approaching trains on the crossing track on account of a high bluff. On the morning in question the watchman, Thomas Baer, became confused, and, according to the press despatches, gave the clear signal to freight trains on both roads at about the same time, and a collision resulted, in which one fireman was killed and one engineer injured. The fireman was an acquaintance of Baer, and the latter, acknowledging his fault and overcome by remorse, went to his house, a short distance away, and committed suicide by shooting himself in the forehead. He was 73 years old, and had been in the employ of the Crane Iron Co. for more than 40 years.

The October report of the Department of Agriculture is not an encouraging document. The condition of cotton, generally, has fallen to 70.7 as compared with 73.4 in September and 85.6 in June. The reports from the most productive part of the cotton region are not bright; Texas, which produced about 31 per cent. of the last crop, shows a condition now of 65 against 77 last year. The causes assigned are drought generally, too much moisture in some places, and insects, and the opinion is expressed that nothing but a late and favorable fall can improve matters. The report as to the condition of the corn crop is not so bad, but still it is not very bright. The average condition is 75.1 against 79.8 in October, 1892, and it has declined to this point from 76.7 in September. This also is attributed mostly to the very widespread drought which was most severe in the principal corn growing states. The reports of the yield of wheat per acre shows a falling off of 1.7 bushels from last year to 11.3, and the average condition of oats, barley and buckwheat is somewhat below last year's crop.

It is stated this week that the arrangement by which the Lehigh Valley Railroad is to purchase the coal produced by individual operators along its line is likely to be successfully carried out. This plan is, in substance, the same as that established with the individual operators by the Philadelphia & Reading when Mr. McLeod took control; the coal is taken by the railroad, hauled to tidewater and sold by the road at the market rate, and 60 per cent. of the price, less 15 cents a ton commission, is paid to the operators. The difficulty with the Lehigh Valley, since it cut loose from the Reading, was to provide the necessary working capital, and this capital is now, it is said, to be furnished by the individual operators. The Lehigh Valley people at first asked for \$3,000,000, but they now think that \$2,000,000 will be sufficient, and the operators have raised nearly or quite this amount. One report states that the operators will take Lehigh Valley bonds at par to the extent of \$1,500,000.

It appears that the tunnel of the Baltimore Belt Line, under the streets of that city, which is to provide a connection between the Philadelphia Division and the main line of the Baltimore & Ohio, is not to be opened for business just at present, and very likely will not be opened before next spring. It was announced in the newspapers a week ago that the tunnel proper had been completed, and we believe that is substantially true; but the construction of the approach at the north end has been much delayed by difficulties in securing the right of way.

NEW PUBLICATIONS.

Journal of the Association of Engineering Societies, August, 1893.—To us the most important paper in the August issue of the *Journal* is one by Mr. Beckler on the Reconnaissance and Location of the Pacific Extension of the Great Northern Railway. A part of that will be reproduced, together with a map and profile, in the *Railroad Gazette*. Another paper is Reduction Formula for Stadia Leveling, by Mr. J. L. Van Ornum, and another very short one is on An Instance of Freezing Water in a Submerged Pipe, by Mr. Dexter Brackett.

In January, 1893, water was found frozen in a pipe under a channel about 15 ft. deep at low water, the pipe being about 3,400 ft. long. About 1,500 ft. of the pipe, in the deepest portion of the channel, was not covered by earth; the rest was in trench under water. On examination, the pipe was found to be free from ice at the shore ends, but frozen in the middle of the channel. Long pieces of ice were found inside the pipe—that is, fresh water running in a pipe under 15 ft. of salt water had frozen. It was found that the temperature of the salt water in the harbor was but 28 degrees.

Another paper in the same issue is on Electric Street Railroads, by C. F. Uebelacker, of the Cleveland Club, who says that it is but five years since the first commercially successful electric road was installed at Richmond, Va., and now there are in the United States alone thousands of miles of electrically operated street railroads, the United States in fact being far in the lead in mileage and in completeness of apparatus. His paper is a general consideration of the reasons which make an electric railroad profitable and desirable or the reverse.

Another paper is Preliminary Surveys for Railroad Line, by James Ritchie, of the Cleveland Club. He has in charge a projected railroad, in the surveys for which some methods have been employed not in accordance with the long-established practice in that kind of work. The line extends from the harbor at Fairport, Lake Erie, about 46 miles to Phalanx, on the line of the New York, Lake Erie & Western, and it is intended to continue it to Youngstown, about 20 miles farther southeast. Mr. Ritchie decided to use the stadia for all surveys after the first preliminary, but, in deference to the wishes of his associates, ran one line by the old method which gave a good means of comparison of cost and results. The greatest variation from the preliminary chain survey at points of intersection was found to be 20 ft. in distance while the direction was in no case appreciably erroneous. The levels were taken by vertical angles, checking on the first preliminary line as often as possible; the greatest error being found to be 0.3 ft. On the maps made from the stadia survey, a location was plotted and a profile was made of this location, which is quite as accurate as could be obtained in the field, and for an estimate of the cost is superior to any preliminary profile. The chain survey of 45 miles occupied 24 days; the stadia survey of 46 miles, averaging about 800 ft. in width, occupied 30 days. The points determined by the stadia survey were, all main stadia stations and side stations for extending topography, and all buildings, fences, land-lines, roads and topographical features, including changes in slopes. All these points were determined by rod readings, with horizontal and vertical angles. This paper was quite thoroughly discussed by the Cleveland Club, and the discussion appears, with the paper, in the *Journal*.

Compound Locomotives. By Arthur Tannatt Woods, M. M. E., late Assistant Engineer United States Navy. Professor of Mechanical Engineering, University of Illinois, etc., etc. Second edition; Revised and Enlarged, by David Leonard Barnes, A. M., C. E. Chicago: The Railway Age and Northwestern Railroader, 1893. Pages 330, octavo. Profusely illustrated, with a glossary and an alphabetical index. Price \$3.

When Professor Woods died he left, besides other unfinished work, a considerable part of the manuscript for the second edition of his little book on the compound locomotive which was first published in 1891. Although his scheme was well worked out and a great deal of the material collected, there was still very much to do in digesting, expanding and arranging this material. Fortunately, Professor Woods left behind him some generous and devoted friends, and a wife of undaunted courage and energy, all of whom felt it a privilege to be allowed to help in the completion of the work which he had much at heart. The result of their combined labors has been to collect and present his studies on this one subject in logical order and in an attractive form.

Of course the reader knows very well that between the first and second editions of this book has lain the real life of the compound locomotive, for at the time of the publication of the first edition the types of compound locomotives and the number of individuals of each type that were in use were very few indeed. Since that time experience with the compound has advanced greatly, and the second edition is essentially an entirely new work. The aim in the preparation of the second edition is stated by the editor to have been to add all important developments, and to place before the reader the actual construction and practical value of compound locomotives that have gone into service rather than to describe the plans of various inventors, and so merely proposed designs have been omitted. Extended theoretical discussion has also been avoided, on the ground that accumulated experience is not yet enough to make that discussion of much practical value.

The first 10 chapters have been prepared with special reference to students; chapters 11 to 20 refer more particularly to the different types of compound locomotives and have been arranged for designers; chapters 21 to 23 are intended to put before the reader a comparison of different types and of compound and simple locomotives. The appendix expands some of the topics treated in the body of the book.

This is a book which has been waited for a good many months with great interest by those who are intelligently considering, either in general or detail, the use of the compound locomotive, and we feel sure that they

will not be disappointed either in the amount of information which the volume gives to them or in the way in which it is given.

Tables for the Computation of Railway and Other Earthwork. Computed by C. L. Crandall, C. E., Assistant Professor Civil Engineering, Cornell University, M. Am. Soc. C. E. Second edition. New York: John Wiley & Sons, 1893. Pages 42, octavo. Price, \$1.50.

In his preface to the first edition the author says that the object of these tables is to present a convenient aid to the computation of earthwork. The volume is first found by the approximate method of averaging end areas. To this a correction may be added due to the strict prismoidal formula, or a correction due to the modification of it for irregular ground. This separation reduces the labor and allows of computing the approximate value only at first, which is sufficient for all purposes except the final estimate.

The first edition not having been electrotyped, the text has been largely recast in the second, and a proof of the prismoidal formula added, as well as a formula for correction for curvature, and rules for cross-section. The text which gives the derivation of the prismoidal formula and the methods of using and computing the tables occupies 24 pages, and the rest of the volume is given up to a table of 10 pages, giving the volumes by the method of averaging end areas, and another of four pages giving the corrections for triangular prisms. The tables are remarkably good in arrangement and in typography; they give the volume for widths of from one to one hundred, and heights of one to fifty, with marginal tables of corrections for tenths both of height and of width.

Addresses Delivered Before the World's Commerce Congress. Chicago, June, 1893. Official Report. Chicago: The Railway Age and Northwestern Railroader, 1893. Pages 266, octavo. Price \$3.

This volume contains the stated addresses at the opening of the Congress by Mr. Bonney and Mr. Blanchard; the address on the Scope of the Congress also by Mr. Blanchard, and 28 addresses on assigned topics by as many different persons. A few of these have already appeared by abstract in the columns of the *Railroad Gazette*, but of course it was impossible for us to give more than brief abstracts of a very of them. The whole volume is of real and permanent interest as embodying the opinions on modern topics of men who are actually engaged in the work of which they spoke.

Railroad Matters in Chicago.

Freight Traffic.—The roads centering in Chicago with few exceptions are gradually increasing their freight traffic, and although their deliveries of grain here the past week fell 3,028,000 bushels below the same time in 1892, the loss was largely compensated by an excess of flour and miscellaneous farm and dairy products which aggregated 44,175 tons, against 33,530 tons the same time last year. Such business shows signs of further improvement, and some of the best informed predict a continued heavy business the remainder of the year. One General Manager recently said that wheat is the only article of grain freight to show a shortage, and that the shrinkage in that will not exceed 30 per cent., and that this will be largely made up by an increase in mixed freight. Other railroad officers, while not quite so sanguine, think that the last quarter of the year will show as good earnings as any corresponding quarter except in 1892. They all claim that their produce traffic at other points than Chicago is gaining.

The following shows the amount of flour and grain delivered at Chicago by each of the railroads mentioned during the week ending Oct. 7 and the same time in 1892:

By—	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
C. & N. W.	Bbls.	Bush.	Bbls.	Bush.
Ill. Cent.	14,799	1,338,000	21,129	1,894,000
C., R. I. & P.	4,500	1,007,000	575	1,158,000
C., B. & Q.	15,300	888,000	4,700	1,195,000
C. & St. P.	11,602	1,118,000	30,449	3,054,000
C. & Alton	3,900	365,000	7,485	549,000
C. & E. Ill.	300	172,000	.....	307,000
C., M. & St. P.	79,650	1,045,000	27,150	1,172,000
Wabash	1,500	370,000	3,600	342,000
C. & G. W.	29,396	210,000	16,306	503,000
A. T. & S. Fe.	1,631	447,000	450	308,000
L. N. A. & C.	.....	18,000	.....	22,000
Totals.	102,578	7,278,000	111,844	3,304,000

The jobbing trade in general merchandise is somewhat active, and gives a fair amount of desirable freight. Officers of the St. Paul said that their general merchandise business is within 10 per cent. of what it was a year ago, when it was the largest ever handled by them. The general verdict of railroad officers in Chicago is that although the general freight traffic is gradually increasing it is still far below their ability to handle it without increasing train service or operating expenses materially. While they do not predict an expansion in outward business it is thought it will generally consist of heavy bulk freight paying small profits. The Western lines show a fair improvement in mixed traffic in the interior. Vice-President Robinson, of the Atchison, says that their Southwestern business is very good; the strikes in the coal mines west of the Missouri are settled, the mines working full force and a heavy coal traffic moving. The Illinois mines of the company are also giving a fair business.

The deliveries of carloads of grain and livestock at Chicago by the Western roads during the month of September and for the same time last year compare as follows:

	1893.		1892.	
	Grain.	Livestock.	Grain.	Livestock.
Cars.	Cars.	Cars.	Cars.	Cars.
A., T. & S. Fe.	2,068	1,809	2,878	3,213
C., B. & Q.	7,190	6,973	10,002	7,771
C., R. I. & P.	5,029	2,877	5,043	2,693
C., M. & St. P.	4,272	2,607	4,298	2,727
C. & N. W.	5,417	3,887	4,827	3,687
C. & A.	2,439	1,675	2,771	2,435
C. & E. Ill.	785	338	1,627	380
Ill. Cent.	5,699	945	5,404	1,270
Wabash	1,828	1,249	1,803	2,531
Wis. Cent.	21	1,496	28	537
C. & G. W.	908	678	2,083	664
Other roads	805	409	1,327	4,059
Total Cars.	36,371	24,813	42,091	28,367

The shipment of livestock from Chicago by the east-bound roads during the month of September compared with the three preceding years was as follows:

	1893.	1892.	1891.	1890.
	Cars.	Cars.	Cars.	Cars.
B. & Ohio	298	221	203	535
C. & Erie	273	208	323	43
C. & G. Trunk	1,158	1,664	1,090	1,682
Lake Shore	2,096	2,113	2,059	1,397
Mich. Cent.	570	866	819	694
N. Y. C. & St. L.	542	830	1,470	1,012
P. C. C. & St. L.	69	167	165	170
P. Ft. W. & C.	953	1,235	1,417	1,778
Other roads	897	1,034	1,116	1,539
Totals	6,856	8,338	8,662	8,870

Passenger Traffic.—The railroads claim no appreciable diminution in passenger movement, notwithstanding the decrease last week in paid admissions to the World's Fair. Officers of the St. Paul say that their coaches are all in service and fairly filled. General Manager Merrill, of the Burlington, says the same thing, and moreover, that they are running an extra number of sleepers with no empty berths. Officers of the Northwestern say that their trains are all crowded, and a reliable observer tells of having come into Chicago by a train which was run in seven sections. Similar reports come from the Rock Island. That road was expecting to bring in 175 cars filled between Saturday evening and Monday morning for Chicago Day. The annual fair at St. Louis has also helped materially in the passenger business.

During the past 36 hours the number of passengers brought to Chicago has exceeded the estimates of the most sanguine. Every line centering here was literally overcrowded. Not only were the seats of the coaches full, but the aisles were packed. Hundreds of passengers that came from points 200 miles distant were compelled to stand the entire trip. Great efforts were made to get equipment enough. Every train that arrived from Saturday morning until late Sunday night returned as quickly as the coaches were empty, and cars employed in local service were diverted to distant points and their places taken by those that came with through trains too late to be returned to their regular departing points.

It is impossible now to estimate the number of passengers brought to the city since Saturday morning. The figures given by the daily papers are mere guesswork. As many of the visitors are not expected to remain over a single day, the roads will commence running extra trains to points within 150 miles at nine o'clock to-night, and continue them through the night.

CHICAGO, Oct. 9.

The Buda-Pesth Bridge Competition.

The Royal Hungarian Ministry of Commerce invites competitive designs for two highway bridges over the Danube, to be built in the city of Buda-Pesth. The bridges are to have a substructure of masonry and a metallic superstructure, and their lengths between bulkheads will be 1,025 and 1,087 ft. respectively. It is desirable that the stream be crossed with single spans, otherwise the bridges are to have a center span of about 580 ft. and two equal side openings. The considerable river traffic makes it desirable that the erection be effected without falsework. The river bed consists mostly of hard blue clay, overlain by sandy gravel, while at a few places the limestone rock is within a few feet of the surface. The banks are artificial. The bridges are to give a clear height of 48 ft. for a central distance of 328 ft., for which distance the depth of the floor system is not to exceed 5 1/2 ft. The grades toward the abutments must not be more than 2 1/2 per cent. The bridges will have a roadway 33 ft. and two sidewalks of 10 ft. each. They are to be designed for a uniform live load of 93 lbs. per square foot, and the floor system must be able to carry two four-wheel wagons, moving side by side, with a load per wheel of four and of six tons for the two bridges respectively. As maximum wind pressure 51 lbs. is to be taken per square foot of lateral surface of the unloaded part of the bridge. Wrought iron or soft steel are permitted. The admissible stresses per square inch are for the trusses 12,800 and 14,300 lbs. respectively, and 10,000 and 10,700 lbs. for the floor system.

The bridges are to take a dignified place among the notable structures of the capital, especially so the Eskuter bridge, which is in the center of the city, and in the neighborhood of a noted suspension bridge. The cost of each bridge should not surpass \$1,050,000.

To the best design for either of the bridges a prize of \$6,250 will be awarded. The second best plan will receive \$4,150, and other plans may be bought for \$1,050 each. An additional \$2,100 will be given to the best design, if it solves satisfactorily the bridging of the Danube at Eskuter with a single opening.

The competition closes Jan. 31, 1894. Specifications and maps may be obtained from the Austro-Hungarian Consulate, 33 Broadway, New York City.

TECHNICAL.

Manufacturing and Business.

The Lidgerwood Manufacturing Co., of New York, which manufactures the Lidgerwood rapid ballast unloader, has already received orders for 22 of the machines, although it was only put on the market last year. It is an ingeniously contrived apparatus for economically and expeditiously unloading gravel, ballast, sand, etc., from platform cars in steam railroad construction work. The machines have been sold to the following firms and railroad companies: Drake & Stratton Co., seven; Smith & Hanfield, two; Adirondack & St. Lawrence Railroad, three; Terminal Railroad Association of St. Louis, one; Lake Shore & Michigan Southern, one; Lehigh Valley, one; Cleveland Iron Mining Co., one; Lake Erie & Western, one; Pennsylvania, one; Boston & Albany, one; Standard Lime & Stone Co., two, and Cahill, Collins & Co., one.

The works of the Gilbert Car Manufacturing Co., on Green Island, N. Y., near Troy, resumed operations on Oct. 9, by an order from the Court, after being closed for six weeks, or since the Receivers were appointed. About 300 men are now employed. The shops are working on a contract for the Lake Street Elevated of Chicago. There are 50 cars yet to build to complete this order. A meeting of creditors to consider the financial affairs of the company is to be held in New York this week. Receiver William Shaw says that plans will be discussed looking to the reorganization of the present company and also for the formation of an entirely new concern.

The Pennsylvania Steel Co. held its annual meeting in Philadelphia last week. All the old members of the board were re-elected and the number was increased by the addition of Effingham B. Morris, President of the Girard Trust Company, which corporation is one of the Receivers. The Directors are: Luther S. Bent, Edmund Smith, H. H. Houston, William M. Spackman, William D. Winsor, Effingham B. Morris and Wayne MacVeagh.

The Reynolds Railroad Gate Co., of Utica, N. Y., organized to manufacture the Reynolds automatic highway crossing gate, has elected the following officers: George A. Reynolds, President; Edwin H. Risley, Vice-President, both of Utica; George Lanz, of Lanz, Owen & Co., manufacturers of leather novelties, Chicago, Treasurer; Isaac J. Lewis, of Chicago, Secretary. Dion Geraldine, of Chicago, is Chief Engineer. The principal office will be in the Board of Trade Building, Chicago. The Reynolds gate was invented by Mr. G. A. Reynolds, of Utica, and a gate erected under his specifications has been in use at one of the busiest crossings on the West Shore Railroad in Utica since 1882. The gate was described in the *Railroad Gazette* of May 12, 1893.

The Mt. Vernon Car Manufacturing Co., of Mt. Vernon, Ill., has increased its capital stock to \$200,000.

The shops of the Westinghouse Air-Brake Co., at Wilmerding, Pa., shut down on Oct. 5, and it is announced that they will be closed for about three weeks. Few orders for brake equipment have been received and a large stock of material has accumulated. While the shops are closed a new boiler plant is to be put in.

David Bell, the oldest iron and steel shipbuilder on the Great Lakes, has made an assignment. Mr. Bell's yards at Buffalo have been in operation for about fifty years. They will now be run under a receiver.

At the annual meeting of the La Burt Car Coupler Company, held in New York City, Oct. 4, the following officers were elected: President, W. H. Agricola; Secretary, A. W. Lowry, and Treasurer, John La Burt. The company's New York office is at No. 203 Broadway.

The Sinclair Construction Co. has been organized at Chicago, with a capital of \$100,000, by Donald Sinclair, Edward F. Curry and O. W. Meyersburg.

The Philadelphia Bridge Works, at Pottstown, Pa., which have been idle, started up on double turn on Oct. 9, contracts having been received to keep the shops busy for some time.

The statement of the Michigan Peninsular Car Co. for the year ended Aug. 31, 1893, shows net earnings of \$866,690, which, after paying fixed charges, including a dividend of eight per cent. on the preferred stock, leaves more than 18 per cent. profit. Eight per cent. was paid on the common stock, and a little over 10 per cent. carried to the surplus fund. The cash assets of the company amount to over \$3,000,000, and the fixed assets to over \$7,000,000.

The Buffalo Car Wheel Works, which have been shut down for the usual summer repairs, have resumed work. The works have a number of large orders on hand.

Messrs. Craig & Young, railroad contractors, who have subcontractors' liens on the Ohio Southern road and other property valued at \$12,000, have made an assignment at Columbus, O.

The Swem railroad gate, which has been in use at the Union Station in Denver for some time, is pronounced by the railroad officers to be very satisfactory, as far as tested. It cost \$200 less than other gates, has a very quick action and is very durable. An application for a patent has been applied for by the Swem Railway Supply Co., of Denver.

New Stations and Shops.

The Buffalo, Rochester & Pittsburgh has purchased land in Bradford, Pa., for a freight yard and a site for a new freight house.

Work will be begun this week on a 20-stall round house for the Duluth, Missabe & Northern at Duluth. Plans have been prepared for a shop plant and it is the intention of the company to have as much of the work as possible done this fall.

The walls of the car shop for the Northern Pacific, at Brainerd, Minn., are up ready for the roof. It is probable that further additions to these shops will be made next season. The tools for the new car shop have not yet been purchased.

The W. F. Porter Steam Heating Co., of Minneapolis, Minn., is installing the steam heating plant in the Spokane, Wash., shops of the Great Northern. The buildings were completed some time ago; the tools are now being placed and the plant will be ready for occupancy on Dec. 1, when the heating contract is completed.

The Brake Beam Patents.

We published last week a communication from the Chicago Railway Equipment Co. with regard to the patents on brake beams. We have received the following circular from the American Brake Beam Co., W. A. Pungs, General Manager, in answer to the claims made by the Chicago Railway Equipment Co.:

"Their claim that all of the brake beams manufactured by the American Brake Beam Co. infringe on one or more of their patents is absolutely false. After claiming infringements for the past six years, they have at last mustered up courage enough to commence suit against the American Brake Beam Co., but only on one patent, viz., the Universal steel brake beam. The following opinion of the Western Railway Association Attorneys will be of interest in this connection:

NOV. 16, 1891.

"As is well known to most of our members, the National Hollow Brake Beam Co., of Chicago, has long been claiming that all other tubular brake beams are an infringement on the patent of Philip Hein, April 12, 1887, No. 361,009. This claim, however, has never been admitted by the Association, but, on the contrary, is believed to be without any foundation whatever."

The National Company, having probably become convinced that no such broad construction could be given to the Hein patent, has recently made an arrangement with one Stephen Alley, who took out a patent in England, Dec. 12, 1891, for the method of making a U-shaped trussed brake beam, and on Oct. 20, 1891, they obtained, as assignees of said Alley, a United States patent, No. 491,776, claiming broadly "a trussed metal brake beam, in which are combined a concave convex compression member, a double inclined tension member, and an interposed strut or draft piece, substantially as and for the purpose set forth."

We are informed further, that the National Company have taken out this patent for the express purpose of prosecuting claims of infringement against the makers and users of any and all trussed brake beams answering to the above description, and more especially that known as "The Universal Brake Beam," made under the patent of Johns & Slattery, June 24, 1890, No. 430,937, and which has come into quite extensive use, their connection, of course, being that the said United States patent of Alley, though later in date of issue, will anticipate that of Johns & Slattery, by reason of prior invention.

We are advised by counsel that the claim above is either wholly invalid, or, if valid at all, that it can only be sustained by giving it a construction so narrow as not to cover the Universal Brake Beam.

We have thought it proper, however, to call your attention to the matter, so that you may determine for yourselves what course to adopt under the circumstances. If any further information is desired it can be at once obtained by addressing this office. By order of the Executive Committee,

GEORGE PAYSON, General Counsel.

"As additional security to our customers against any loss through using any beams manufactured by this company, we will give them a bond indemnifying them against any loss whatever. The said bond to be signed by a surety, whose financial standing will be A1."

Manchester Ship Canal.

The Chairman of the Works Committee of the Manchester Ship Canal has announced to the city council at Manchester that the canal will be ready to open for traffic Jan. 1 for its entire length.

The Busk Tunnel.

On the 1st of the month there remained but 113 ft. of heading to be driven, and progress is making at the rate of about 10 ft. a day. Blasts shot in one heading are plainly heard in the other. As much retimbering is to be done, the tunnel will not be opened for traffic before January.

A New White Star Freighter.

The White Star steamer "Cevic" was launched at the yards of Harland & Wolff, Belfast, Sept. 23. This is a twin screw steamer for freight and live stock traffic of the same class as the "Bovic" and the ill-fated "Naronic," and is the largest freight steamer in the world. The principal dimensions are: Length, 500 ft.; breadth, 60 ft.; depth, 38 ft. Her registered gross tonnage is 8,315. There will be accommodations for 800 head of cattle on the upper decks, and stalls for 20 horses amidships. The vessel will be fitted with two sets of triple-expansion engines driving separate propellers.

The Harlem Lift Draw.

The temporary lift draw of the New York Central & Hudson River Railroad over the Harlem River was put in service last Saturday, after which time trains ran regularly over it until Wednesday morning. Then the

draw was disabled, delaying traffic for about three hours until connections could be restored with the old draw. We have no precise knowledge yet of cause of the trouble, but we are informed that the machinery was not in such good condition as to warrant putting it into service at this time.

The "Lucania's" Record Breaking Voyage.

The Cunard twin screw steamer "Lucania" has made the fastest westward voyage across the Atlantic on her second trip, having made the voyage from Queenstown to Sandy Hook in 5 days 13 hours and 45 minutes, corrected time. This is 39 minutes faster than the best previous record, 5 days 14 hours and 24 minutes, made by the "Paris," in October, 1892. The "Lucania" passed Daunts Rock, near Queenstown, at 1:10 p. m. on Oct. 1, and arrived off Sandy Hook at 10:04 p. m. Oct. 7, and not only made the best time across the ocean, but also secured the record for the best 24 hours' run, having made 580 knots in one day; she also made the best average speed, 20.8 knots.

Besides these three victories the vessel also holds the record for the best maiden voyage, 5 days 15 hours and 46 minutes, made in September, 1893. The daily runs on the last trip were as follows: Oct. 2, 452 knots; Oct. 3, 503; Oct. 4, 542; Oct. 5, 508; Oct. 6, 560; Oct. 7 (last day), 210; total, 2,775 knots. The best day's runs on the westward trip have been: "Paris," May, 1889, 515 knots; "Teutonic," August, 1891, 517; "Paris," July, 1892, 520; "Teutonic," August, 1892, 528; "Paris," October, 1892, 530; "Campania," June, 1893; 548; "Lucania," October, 1893, 560.

Below is a table of average speed on the westward trip:

"Teutonic," August, 1891.....	20.34
"Majestic," February, 1892.....	20.41
"Paris," July, 1892.....	20.48
"Paris," October, 1892.....	20.70
"Campania," June, 1893.....	20.86

The following table shows the fastest westward voyages in the last three years:

"Paris," May, 1889, 5 days 23 hours 7 minutes.
"Paris," August, 1889, 5 days 19 hours 18 minutes.
"Majestic," July, 1891, 5 days 18 hours 8 minutes.
"Teutonic," August, 1891, 5 days 16 hours 31 minutes.
"Paris," October, 1892, 5 days 15 hours 58 minutes.
"Paris," October, 1892, 5 days 14 hours 24 minutes.
"Lucania," October, 1893, 5 days 13 hours 45 minutes.

The Canadian Sault Ste. Marie Canal.

The masonry of the walls of the new "Soo" canal locks has been finished. Work is now proceeding on the piers and abutments of the new railroad bridge, the contract for the superstructure of which was awarded the other day. Good progress is also being made upon the foundation of the power-house, and all the work is proceeding so rapidly that it is confidently expected the canal will be ready by the opening of navigation next spring. The five pairs of lock gates, the contract for which was recently awarded to Hugh Ryan & Co., will cost between \$60,000 and \$70,000. The Canadian lock is 60 ft. wide. The new lock on the American "Soo" canal is 100 ft. wide. The contract for the five pairs of gates for that work was recently let to the Detroit Bridge & Iron Works, its price for the estimated quantity of material required being \$182,612, and the work is to be completed by November of next year.

A Submarine Boat.

A novel design for a submarine boat was recently submitted to the U. S. Government under its advertisement for plans for a submarine naval boat. The plan involves the construction of a craft that can be sunk by admitting a limited quantity of water, and can then be operated as a road locomotive on the bottom of the sea. The inventor claims that his boat, on wheels, will not be subject to deflection by currents and waves, and can therefore take her position with accuracy under the vessel that she is to destroy. The boat is floated again by ejecting the water from her hull. The method of preparing the bottom of the sea to permit this amphibious craft to crawl over it is not explained.

THE SCRAP HEAP.

Notes.

Mr. S. P. Cowell, "Locator" of the Philadelphia & Reading, states that 200 new industries have been induced to locate at points on the lines of that road during the past year.

The newspapers report a fight between citizens of Bellwood, Pa., and employees of the Pennsylvania Railroad on the night of Oct. 7. The borough authorities tried to lay a water pipe beneath the track, and the railroad objected. A fire engine was used to throw a stream of water on the railroad men, and stones were thrown by the latter.

Three train robbers were killed by their pursuers near Kalispell, Mont., on Oct. 5. They were members of the gang which stopped a Northern Pacific passenger train near Livingstone, Aug. 25, and their captors were a United States marshal and 13 Indian police. One of the latter was killed. Two boys, charged with wrecking a train near Staunton, Ind., about three weeks ago, have been caught at Brazil, Ind., and have made a confession.

Major Latrobe and other prominent men of Baltimore having expressed a desire to have provision made in that city for a permanent home for the great historical railroad exhibit made at Chicago by the Baltimore & Ohio Railroad, the Philadelphia Record is moved to present a similar claim for Philadelphia in connection

with the World's Fair exhibit of the Pennsylvania road. Though smaller and less ambitious than Major Pangborn's magnificent collection, the Pennsylvania's is in many features planned on the same lines and is of great value. Many of the photographs of locomotives showing types which have been prominent at different periods during the last 60 years, and most of the historical documents, such as contracts, advertisements, timetables and bills of lading, it would be impossible to replace if destroyed.

Electric Ambulances.

A contract has been let for an electric street car ambulance for the city of St. Louis. The various street railroads have consented to allow the use of their tracks for running this car.

Railroad Taxes.

The New Hampshire Board of Equalization reports the total valuation of railroad property in the state for the current year as \$20,963,000, which includes \$71,000 for street railroads. The total amount of taxes assessed by this Board is \$307,790, being 1½ per cent. of the average property rate throughout the state, on the above-named amount, less the valuations assessed against the roads in towns and cities upon property not used in the operation of the road. The same Board assesses the telegraph companies \$195,400 and telephone companies \$146,600. The cost of maintaining the railroad commission, \$7,440, is taxed upon the railroads, including street lines, in proportion to their gross receipts, which latter are reported as \$7,030,000.

The State Board of Equalization of the State of Washington has made up the assessment for the taxation of railroads in that state for the current year. The railroads are divided into four classes: (1) Transcontinental trunk lines; (2) standard gauge lines connecting with roads of Class 1; (3) standard gauge lines not otherwise included and narrow gauge lines connecting with transcontinental roads; (4) all other railroads. Roads in Class 1 are assessed \$5,300 a mile; Class 2, \$5,000, Class 3 \$4,500, and Class 4 \$3,500. A graded right of way is assessed at \$1,000 a mile, and side tracks are assessed at 40 per cent. of the valuation of the main line to which they belong. The total mileage of track in the first four classes (which is probably identical or nearly identical with the mileage of road in operation) is 2,704 miles, and the valuation \$14,743,376. The total valuation of rolling stock and personal property is \$2,324,570, making the total valuation of railroad property \$17,233,246.

Great Northern Snow Sheds.

The contractors for the snow sheds, which are all on the west slope of the Cascades, are making excellent progress. There are six sheds included in the contract, which is to be completed before Nov. 15. Messrs. Mathews & Krech, of St. Paul, are the contractors.

CAR BUILDING.

The Lebanon Manufacturing Co. has finished an order for cars for the Berwin & White Coal Co., and is now engaged on four large molasses cars, to be shipped to Cuba. The company has an order for 250 cars for the Clearfield coal trade from the Beech Creek road, and 70 cars have been delivered on this order. All the coal cars are equipped with air-brakes.

BRIDGE BUILDING.

Buffalo, N. Y.—Bids for the construction of a bridge on Delavan avenue, over Scajaquanda Creek, have been received by the Board of Public Works as follows: Massillon Bridge Co., \$2,037 and \$2,127; Kellogg Iron Works, \$2,113; A. D. McConnell, \$3,390; Henry Clark, \$2,600; King Bridge Co., \$2,498; Buffalo Bridge & Iron Works, \$2,584.

Charlottetown, P. E. I.—J. W. Morrison, Secretary of Public Works, is receiving bids for constructing a bridge across South Lake, in Kings County.

Excelsior, Minn.—The Minneapolis & St. Louis Railroad will erect a swing bridge over an arm of Lake Minnetonka near this place.

Homestead, Pa.—Plans for the bridge between this place and Braddock have been in the possession of the Carnegie Steel Co. for some months, but the structure will not be built before next year.

Hudson, Wis.—The Milwaukee Bridge Co. has commenced work on a new iron wagon bridge over the Sioux River at this point.

Kettle River, Minn.—The Edge Moor Bridge Works have completed the erection of a single span over this river for the Great Northern road.

London, Ont.—The bridge across the river Thames at Dorchester station has been condemned by the County Commissioner, Mr. T. B. Talbot, and a new iron structure will be constructed.

Meadville, Pa.—The County Commissioners have given the Canton Bridge Co. the contract for a 93-ft. span bridge over the Cussewago Creek, in Valionia, at its bid of \$1,200.

Meyersdale, Pa.—Bridges are to be erected over Cox's Creek in Somerset township, along the Stayes-ton road and at Robert's Station.

Minneapolis, Minn.—Nothing has been done in the matter of changing the grade of the Hastings & Dakota Division of the Chicago, Minneapolis & St. Paul in this city. Two plans are under consideration. The original plan is to lower the grade of the tracks which would be crossed by overhead highway bridges. The second plan is to depress the streets at the crossings and for the tracks to be carried on viaducts over the principal ones. The railroad company will not begin this work without making a fight in the courts.

Ottawa, Ont.—The Board of Trade has recommended the granting of a subsidy of \$150,000 by the Dominion Government toward the proposed interprovincial bridge to span the Ottawa River between this city and Hull, and which the engineer now estimates will cost \$800,000. This is a project of H. J. Beemer, contractor of Ottawa. The Ontario government will be asked to give \$100,000 and the Quebec government \$50,000.

The Receiver of the Findlay, Fort Wayne & Western has secured permission from the courts to build a long two-span iron bridge over Blanchard River, near this place.

The contract for the construction of a bridge over the

Gatineau River near Gatineau Point has been awarded to Vian & Lachance for the roadway, approaches, pier and abutments, at the price of \$15,079, and the Dominion Bridge Co. has the superstructure at \$13,900.

Pottsville, Pa.—The Pottsville Iron & Steel Co. has secured the contract for building the Nichols street bridge. Its bid was \$5,830 for Plan A, \$5,891 for Plan B and \$2,775 for Plan C. This includes the removal of the old structure. Plan A was adopted. The structure is to be finished in six weeks.

Sault Ste. Marie, Ont.—The contract for the steel superstructure of the railroad bridge over the "Soo" canal has been awarded by the Dominion Government to the Hamilton Bidge Co. The contract calls for a steel bridge composed of one swing span of 250 ft., and a fixed span of 75 ft. to carry the Canadian Pacific tracks over the Sault Ste. Marie Canal.

Sharon, Pa.—The county will have to erect a new iron bridge over the Shenango River south of this town to replace the structure which failed recently.

Vancouver, B. C.—Messrs Palmer & Corrigan, Civil Engineers, have just completed plans for the new pile bridge across the North Arm of the Frazer River. The length will be upward of 1,000 ft. It will consist of three parts, two small islands being in the line of the construction. The first section will be 538 ft. in length, having two spans of 89 ft. each, with a swing 182 ft. in length. The second section will be 150 ft. in length, in spans of 40 ft., and the third 1,220 ft.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Central of New Jersey, quarterly, 1½ per cent., payable Nov. 1.

European & North American, semi-annual, 2½ per cent., payable Oct. 16.

Georgia Railroad Banking Co., quarterly, 2½ per cent., payable Oct. 15.

Long Island, quarterly, 1½ per cent., payable Nov. 1.

Mexican Northern, quarterly, 1½ per cent., payable Oct. 20.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama Great Southern, annual, Birmingham, Ala., Oct. 18.

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 6.

Atchison, Topeka & Santa Fe, annual, Topeka, Kan., Oct. 25.

Central Massachusetts, annual, Boston, Mass., Oct. 25.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 25.

Denver & Rio Grande, annual, Denver, Col., Oct. 17.

Evansville & Terre Haute, annual, Evansville, Ind., Oct. 16.

Illinois Central, annual, Chicago, Oct. 18.

Louisville & Nashville, special, Louisville, Ky., Nov. 8, to vote on an increase of the stock to \$60,000,000.

Manhattan Elevated, annual, New York City, Nov. 8.

Manitou & Pike's Peak, annual, Manitou, Col., Oct. 21.

New Orleans & Northeastern, annual, New Orleans, La., Nov. 1.

New York, New Haven & Hartford, annual, New Haven, Conn., Oct. 18.

Northern Pacific, annual, Mills Building, New York City, Oct. 19.

Pullman's Palace Car Co., annual, Chicago, Oct. 19.

St. Louis & San Francisco, annual, St. Louis, Mo., Oct. 24.

Spokane Falls & Northern, annual, Spokane, Wash., Nov. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The International Association of Railroad Superintendents of Bridges and Buildings will hold its third annual meeting at the Continental Hotel, Philadelphia, Pa., Oct. 17, 18 and 19.

The Southwest Association of Railway Surgeons will meet in St. Louis, Mo., Oct. 26.

The Western Railway Club meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7:30 p. m.

The Northwest Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except June, July and August, at 8 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday.

The Technical Society of the Pacific Coast meets at its room in the Academy of Sciences building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Tacoma Society of Civil Engineers and Architects meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

The Boston Society of Civil Engineers meets at Westlan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The Western Society of Engineers meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The Engineers' Club of St. Louis meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Engineers' Society of Western Pennsylvania meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Proposed Amendments to Interstate Commerce Law.

Congressman Storer, of Ohio, from the Committee on Interstate and Foreign Commerce, has reported to the House, with the recommendation that it pass, his bill amending the interstate commerce law so as to provide that copies of tariffs of rates and fares, filed with the Commission, shall be preserved as records and shall be prima facie evidence in investigations by the Commission and in all judicial proceedings. The measure is the same as one reported from the Committee last Congress and passed by the House.

Mr. Storer finds no objection to putting these documents on the same footing with similar documents in the possession of other departmental officers of the government, and allowing them, when authenticated by the Secretary of the Commission, to have the same force that Section 882 of the Revised Statutes gives authenticated copies of papers from other offices.

Mr. Storer also reported favorably from the Committee his bill amending the interstate commerce law so as to make it unlawful for any common carrier, subject to the provisions of the law, to perform or render or participate in rendering any service in transportation subject to the provisions of this act until a tariff of the rates, fares and charges for such service has been authorized and established by such carriers and filed with the Interstate Commerce Commission and published as required by it.

American Society of Civil Engineers.

The Nominating Committee has recommended the following ticket which is issued by the Board of Directors: President, W. P. Craighill; Vice-Presidents, F. Collingwood and Joseph M. Wilson; Secretary, Charles Warren Hunt; Treasurer, John Bogart; Directors, Wm. H. Burr, Bernard R. Green, Joseph M. Knapp, T. Gifford Smith, Robert B. Stanton, Henry D. Whitcomb.

PERSONAL.

—Mr. J. B. Sneed, Traffic Claim Agent of the Missouri, Kansas & Texas at Denison, Tex., has been promoted to be General Livestock Agent of the company, succeeding Maj. S. W. Hunt, resigned.

—Mr. George H. Clark, Superintendent of the Long Island Express Co., has been appointed Superintendent of the floating equipment of the Long Island Railroad, in place of Mr. George M. Kelly, resigned.

—Mr. Warren V. Galbraith, now at the Sedalia office of the Missouri, Kansas & Texas, has been promoted to be Traffic Claim Agent of the company, with headquarters at Denison, Tex., to succeed Mr. J. B. Sneed.

—Mr. Charles F. Parker has been appointed Superintendent of Telegraph of the Denver & Rio Grande Railroad. This office has been vacant since Mr. J. J. Burns was promoted to be Superintendent of the First Division in January, 1892.

—Mr. A. J. Hendrix has been elected Treasurer of the Northern Central Railroad, with which he has been connected 22 years altogether, acting as cashier in recent years. Mr. Hendrix succeeds John S. Leib, deceased, as Treasurer of the company.

—Mr. B. F. Egan has been appointed Superintendent of the Des Moines, St. Joseph & Kansas City Division of the Chicago Great Western, with headquarters at South Des Moines, Ia., in place of Mr. L. B. Ridpath, transferred. Mr. Egan has heretofore been Superintendent of the Dubuque Division at Dubuque, Ia.

—Mr. John P. Ramsey, Superintendent of the Ohio Southern road, has resigned, and the office has been abolished. Mr. Ramsey went to the Ohio Southern in July, 1892, as Superintendent, from the Columbus, Hocking Valley & Toledo, on which road he had been Engineer of Maintenance of Way for years.

—Mr. W. R. Busenbark, Traffic Manager of the Chicago Great Western Railroad, is said to have tendered his resignation, to take effect Oct. 15. He has held this position since November, 1890, and was previously General Passenger Agent of the Chicago, St. Paul & Kansas City road, which was succeeded by the Chicago Great Western.

Judge Warwick P. Hough, of St. Louis, and S. J. Beals were appointed Receivers of the Sioux City & Northern Railroad by the United States Court in Sioux City last week. Mr. Beals is Secretary and Treasurer of the company and represents the secured creditors, and Judge Hough represents the unsecured creditors.

—We have already stated that Mr. George H. Thompson, Bridge Engineer of the New York Central & Hudson River, has retired from the service of that road and opened an office as Consulting Engineer, making a specialty of bridge design, superintendence and inspection. His office is in the Wagner Palace Car Co.'s building, opposite the Grand Central Station, New York.

—Mr. Edward Elden, Master Mechanic of the Toledo Division of the Lake Shore & Michigan Southern road, with headquarters at Norwalk, O., has been transferred to Buffalo, to take charge of the Buffalo Division, to succeed Mr. John Robinson, deceased. Mr. Elden will be succeeded at Norwalk by James Bardeen, who was formerly foreman at Toledo.

—Mr. Henry De Wolf, Treasurer of the Illinois Central Railroad, died suddenly of heart failure in his office in Chicago, on Oct. 10. Mr. De Wolf was born in Alton, Ill., and entered the service of the Illinois Central as a clerk in the land department. He was made Cashier of the land department in 1870, and transferred to the operating department in 1872. He was made Treasurer of the company in 1877, and held that office continuously until his death.

—Mr. H. A. Kennedy, Chief Engineer and Assistant Superintendent of the Cleveland, Canton & Southern, has been appointed General Superintendent of the road by the Receivers, Mr. Frederick Swift and Mr. J. W. Waddell, the latter of whom was General Superintendent of the road up to his appointment as Receiver. Mr. Kennedy has been Chief Engineer of the road since 1889, but previously he had been connected for several years with the engineering and roadway departments.

—Mr. E. J. Seymour has been appointed Assistant General Freight Agent of the Chicago & Northwestern road, with headquarters at Milwaukee, in place of Mr. C. L. Wellington, who resigned to accept the position of General Freight Agent of the Wisconsin Central. Mr. Seymour will have charge of all freight traffic on the Ashland Division, formerly the Milwaukee, Lake Shore & Western. Mr. Seymour was Assistant General Freight Agent of that road before the lease to the Chicago & Northwestern.

—Mr. Arthur F. Wendt, a mining engineer of New York, died in Berlin on Oct. 5. Mr. Wendt was born forty-one years ago in Milwaukee and was graduated from the Columbia School of Mines in 1873. He was engaged in the course of his work in the mines of Maryland, Pennsylvania, Tennessee and Arizona. In 1886 he was sent to Argentina and Chile to reopen silver mines, and wrote a number of papers on his experience in South America. For his monograph, "The Pyrites of the Alleghany," Columbia College conferred the degree of Ph. D. upon him.

—Mr. C. L. Wellington has been appointed General Freight Agent of the Wisconsin Central, to succeed Mr. J. B. Cavanaugh, who recently tendered his resignation, taking effect when the offices of the department were removed from Chicago to Milwaukee. Mr. Wellington was formerly General Freight Agent of the Milwaukee, Lake Shore & Western, being appointed to that position in March, 1887. When the road became the Ashland Division of the Chicago & Northwestern he was appointed Assistant General Freight Agent of the latter company, remaining in Milwaukee in charge of the division.

—Mr. J. W. Gephart, of Bellefonte, Pa., has been appointed General Superintendent of the Central Railroad of Pennsylvania, now building, and will have charge of its operation when the road is opened next month. Mr. Gephart is a well known lawyer in central Pennsylvania, being a partner of Ex-Governor Beaver. He was closely identified with the organization of the company, and has been Superintendent of Construction since the building of the line was commenced. Mr. Frank Warfield, at present connected with the freight department of the Beech Creek road, will be General Freight Agent of the new road.

—Mr. Thomas Hawksley, the eminent British engineer, died Sept. 23 at his residence at Kensington, London, at the age of 86 years. Much of his life had been spent in municipal engineering, and his reputation will rest largely upon his achievements as a water works, gas and sewerage engineer. He was born in 1807, and was articled as an apprentice to an architect, Mr. Staveley, in his native town, Nottingham. When 23 years old he was appointed engineer to the Nottingham Water Co., and the success of this work guaranteed his professional career. He was appointed engineer to the gas works in that town a little later, and it was on these lines, as a water works and gas works engineer, that his career was developed. In 1845 he designed the works at Rivington, the first large gravitation works in England. These were followed by many other large works in various English towns, those at Leeds being among the largest, with a storage capacity of 3,726 million gallons and a daily supply of 22 million gallons. Thirty-six years ago he made a study with Sir Joseph Bazalgette and Mr. Bidder of the London sewerage problem, the result of which was the establishment of the present plan; and he designed and carried out many other sewerage works. His reputation extended to other lands, and he was called in consultation in many different countries. His knowledge and judgment and high character made him a valued counselor in a great range of interests. He became a Member of the Institution of Civil Engineers in 1840, and was its President for two successive sessions.

ELECTIONS AND APPOINTMENTS.

Chesapeake, Ohio & Southwestern.—W. J. Mallen, formerly General Foreman of the Norfolk & Western at Kenova, W. Va., has been appointed General Foreman of the mechanical department of this road, with headquarters at Memphis, Tenn., in place of J. L. Keegan, assigned to other duties.

Cleveland Belt.—The annual meeting was held in Cleveland, O., Oct. 5, and the following officers were elected: President, A. C. Barstow; Secretary and Treasurer, O. E. Chapman, General Counsel, H. C. Ranney. J. W. Cassingham and M. C. Barber resigned as directors, and H. C. Ranney and J. W. Wardwell were elected to succeed them.

Cleveland, Cincinnati, Chicago & St. Louis.—The office of William Gibson, Superintendent of the Cincinnati Division, will be removed shortly from Cincinnati to Springfield, O.

Concord & Portsmouth.—At the annual meeting held in Manchester, N. H., Oct. 5, the directors were re-elected, except that Samuel O. Eastman, of Concord, N. H., was elected a director in place of the late Hon. J. J. Bell. John J. Pickering was re-elected President and Wallace Hackett Secretary.

Everett & Monte Cristo.—This road is now ready for traffic, and the permanent organization of the company for the operation of the road was recently effected and the following officers elected: President, F. B. Brown; General Manager, J. T. McBride; Treasurer, Frank Brownell, all of Everett, Wash., and Secretary, H. A. Schenck, New York City.

Grand River Valley.—At the annual meeting held in Jackson, Mich., the following directors were elected: John M. Root, Edward W. Barber, W. H. Withington, Alonzo Bennett, Jackson; Edward S. Lacey, Chicago; Homer G. Barber, Vermontville, Mich.; Nathan Barlow, Hastings, Mich. The officers elected were: President, John M. Root; Vice-President, William H. Withington; Secretary and Treasurer, Jackson, Mich.

Jacksonville Southeastern.—H. S. Rearden has been appointed Master of Transportation, with office at Jacksonville, Ill.

Louisville & Nashville.—At the annual meeting of this company held in Louisville, Ky., Oct. 4, the following directors were elected: August Belmont, J. A.

Horsey, Arnold Marcus, William Mertens, H. E. Garth, J. D. Probst, Thomas Rutter, Jacob H. Schiff, Henry Anthon, New York City; Edmund Smith, of Philadelphia; John D. Taggart, M. H. Smith and John A. Carter, Louisville, Ky. The officers elected were: August Belmont, Chairman; M. H. Smith, President; S. R. Knott, Louisville, and A. M. Quarrier, New York City, Vice Presidents; W. W. Thompson, Treasurer, and J. H. Ellis, Secretary.

Manitoba & Northwestern.—It has been decided to remove the general offices of the company from Portage la Prairie to Winnipeg, Man. The offices that will be removed to Winnipeg are those of W. R. Baker, General Manager; D. B. Hanna, Treasurer, and A. McDonald, Assistant General Freight and Passenger Agent. The officers remaining at Portage la Prairie are: G. H. Webster, Chief Engineer; T. A. Summerskill, Master Mechanic; J. D. Morton, Chief Clerk to the General Manager, and J. G. Henry, Trainmaster and Chief Dispatcher.

Minneapolis & St. Louis.—At the annual meeting held in Minneapolis, Minn., Oct. 3, to elect three directors, W. L. Bull, William Strauss and Edward S. Isham were elected. The following officers were chosen: President, W. H. Truedale, Minneapolis; Vice-President, W. A. Read, of Vermilye & Co., New York City; Secretary, Joseph Gaskell, Minneapolis; Treasurer, William Strauss, New York City, and General Counsel, E. S. Isham.

Missouri, Kansas & Texas.—The Pittsburgh agency of the company, which was abolished early in the summer, has been re-established, and S. P. Kennedy, formerly General Agent of the St. Louis Southwestern at Pittsburgh, has been given charge of the company's interests, with the title of General Agent at Pittsburgh.

Missouri Pacific.—John Hennessey has been made Superintendent of Terminals of the road at Kansas City, Mo., vice James W. Dalbey, resigned.

Northern Pacific.—The following changes in the passenger department are announced: John E. Turner, appointed District Passenger and Land Agent, with office at 42 Jackson Place, Indianapolis, Ind., vice D. W. Janowitz, resigned; appointment effective Nov. 1. W. H. Whitaker, heretofore District Passenger and Land Agent, office at St. Paul, will on Oct. 16 assume the same duties with office at 153 Jefferson avenue, Detroit, Mich., vice A. A. Jack, resigned. Charles E. Johnson is appointed District Passenger and Land Agent, with headquarters at general office, St. Paul, vice W. H. Whitaker, transferred.

Peoria, Decatur & Evansville.—At the annual meeting held in Peoria, Ill., Oct. 3, the following directors were elected: D. J. Mackey, C. C. Baldwin, Henry I. Clark, Heman Clark, E. O. Hopkins, W. J. Lewis, J. M. Deveau, Arnold Kummer, W. H. Goody.

Pontiac, Oxford & Northern.—F. H. Carroll has been appointed Auditor, with office at Pontiac, Mich.

Portland & Rochester.—The following directors were elected at the annual meeting held at Portland, Me., Oct. 4: George P. Westcott, Nathan Webb, William G. Davis and Charles McCarthy, Jr., of Portland; Frank Jones, of Portsmouth, N. H.; Stephen J. Young, of Brunswick, Me.; Joseph S. Ricker, of Deering, Me.; Arthur Sewall, of Bath, Me., and Frederick Robie, of Gorham, Me.

St. Louis Southwestern.—At the annual meeting held in St. Louis, Mo., Oct. 3, the Board of Directors was elected as follows: S. W. Fordyce and W. B. Doddridge, St. Louis; Edwin Gould, M. Gernshein, R. M. Galloway, Thomas T. Eckert, New York City; Robert Moore, A. L. Wolff, St. Louis; Winslow S. Pierce, New York City.

Wisconsin Central.—William Shimwell has been appointed Auditor and W. R. Hancock, formerly on the Lake Shore & Michigan Southern, has been appointed Paymaster and Cashier, both with office at St. Paul, Minn.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Altoona & Pittsburgh.—President S. P. Langdon, of Philadelphia, reports that this road will be ready for operation to Ramey, Pa., as soon as a decision is obtained from the courts permitting the contemplated crossing of the track of the Tyrone & Clearfield branch of the Pennsylvania. All the construction work is completed from Pittsburgh to Ramey, about 12 miles, except about 4,000 ft., which cannot be finished until the decision of the court, which has been long delayed, is announced. The road has been located for about 20 miles from Pittsburgh southwest to Janesville, parallel to the Tyrone & Clearfield branch road for much of the distance. It is proposed to extend the new road next year farther southwest to connect with the Altoona, Clearfield & Northern, the control of which is held by Mr. Langdon and which is now being operated by him under a recent decision of the Pennsylvania courts.

Baltimore & Cumberland.—The surveying and other engineering work on this proposed road is now about completed, or, at least, as much as it is proposed to do this year, and the engineer's office at Hancock, Md., will be closed in a few days, although all the office work is not finished. The work done this year has consisted chiefly in revising the previous location along the entire route from Cumberland to Hagerstown, Md., about 80 miles. The work was done under the direction of Chauncey Ives, Chief Engineer of the Cumberland Valley road, who was appointed to a similar position on the new road this year. Nothing definite is known as to when the actual work of construction will begin, but it is expected that it will be started in March, and that the contracts will be awarded by that time.

Bangor & Aroostook.—The first passenger train over this road was run on Oct. 6, and carried a party of officers and others interested in the road, including Edwin Packard, President of the New York Guaranty & Indemnity Co.; Consulting Engineer Job Abbott, New York; C. P. Treat, Chicago, who has the contract for the construction of the whole line; Vice-President C. F. Bragg and Directors B. B. Thatcher, H. H. Fogg, I. K. Stetson, J. G. Clark and General Manager F. W. Cram. The train was run as far as North Twin Dam, about 30 miles northeast of Brownville, Me., where the new construction work was commenced. Just beyond the dam a temporary bridge has been built, and the permanent bridge is now being erected. The work beyond North Twin Dam as far as Houlton is far advanced, and very little grading remains to be done. Some track has been laid, but the sections are not connected. It is thought that trains will be running to Houlton by Dec. 1.

Butte, Anaconda & Pacific.—It is reported that this road is to be operated by the Great Northern line as soon as completed. The construction work is now being rapidly closed up. The road has been built chiefly by Marcus Daly to give the smelters at Anaconda better railroad facilities with Butte. The line is about 25 miles long between the two towns named, and has been difficult and expensive to build. The train service will probably begin in a few weeks.

British Columbia Roads.—Messrs. Burwell & Irving, of Nanaimo, B. C., have given notice that application will be made at the next session of Parliament for an act to incorporate a company to construct a line from a point on the Gulf of Georgia, British Columbia, to the city of New Westminster.

Central of Pennsylvania.—The building of the road is now about half completed, and it is thought that trains will be put on perhaps by Dec. 1. The organization of the company preparatory to beginning the operation of the road was completed at a meeting of the directors last week at the office, 304 Walnut street, Philadelphia. The road is being built from Bellefonte, in Center County, northeast to Mill Hall, there connecting with the Beech Creek. The main line is now all graded, and more than one-half the track has been laid. The route is through a rich and fertile valley which has heretofore had inadequate railroad facilities. The new line will also give the town of Bellefonte a competing line to the Pennsylvania for its large manufacturing business.

Coos Bay, Roseburg & Eastern.—The engineers who have been making the surveys beyond Myrtle Point and east across the western part of the state to Roseburg, Or., are reported to have finished the survey for nearly the entire line. Contractor R. A. Graham has decided to suspend all construction work until the spring, on account of the rainy season. The road is now in regular operation from Marshfield, Or., or Coos Bay south to Myrtle Point, 27 miles.

Elk Mountain.—S. C. Fulton, of Denver, who is interested in the company, confirms the report that negotiations have been under way for some time to provide funds for completing the line, and that there is a good prospect of a favorable termination. Mr. Fulton says that an influential syndicate in London is considering the underwriting of bonds to the amount of \$1,000,000, and he does not look for any failure in completing this plan. The road extends from Sands, on the Colorado Midland near Carbondale, south to Marble. It is graded for 28 miles, and with the exception of a few bridges is ready for the ties and rails. Its completion will open up the rich marble, slate, coal and iron resources of the Crystal River country.

Everett & Monte Cristo.—The construction company which has been building this road transferred the property to the railroad company last week, after formal inspection of the line by President F. B. Brown and General Manager J. T. McBride, of Everett, Wash., and other directors. The line was built by what is known as the Colby-Hoyt syndicate, of New York City, principally to develop the silver mines at Monte Cristo. The road is 60 miles long, from Everett, on Puget Sound, east to Monte Cristo. S. B. Fisher is the Chief Engineer. The contractors were Henry & Balch, of Seattle.

Glendon & Gulf.—The North Carolina courts have recently handed down final decisions in the right of way litigation brought against this company by the Raleigh & Western to prevent the crossing of the tracks of the latter road. It will be remembered that in a dispute between the companies regarding a crossing in 1892, the forces of the two companies came in conflict, and the question promised to lead to very serious trouble. The decision of the court is now in favor of the above company on all the points raised. It is said that the extension of the line beyond Glendon will now be actively pushed. The company is at present operating about 10 miles of road in Chatham County, N. C. The chief stockholders of the company reside in Philadelphia. The President is John B. Lennig, of Philadelphia, and the General Manager is George F. Edmiston, with office at Gulf, N. C.

Great Northern.—Work has been recently resumed on the extension of the Park Rapids branch to Leech Lake, Minn. This branch was extended during the summer from Park Rapids, the terminus of the Wadena & Park Rapids road, to the town of Akeley, about 20 miles distant. The work was abandoned in July, when this much had been done, and the track was never laid. There is 10 or 15 miles of road to build to reach Leech Lake. The branch will have a large lumber traffic from the forests in the Leech Lake district as soon as it is opened to that place.

The opening of the Sioux Falls, Yankton & Southwestern for regular traffic is announced, the line being operated as a branch of this road. The new road is 60 miles long, extending from Sioux Falls southwest to Yankton, S. D. It was built by a company of which United States Senator R. F. Pettigrew is President.

Jacksonville, St. Augustine & Indian River.—Trains on the extension along the Indian River are now running as far south as Melbourne, Fla., about 10 miles beyond Eau Gallie, which has been the terminus of the operated road since August. The line now being built is to be extended as far as Lake Worth, 120 miles beyond Melbourne. It was thought that the road would be completed to Lake Worth by Nov. 1, but that can hardly be done now, and it is not known when the track will reach that town.

La Porte, Houston & Northern.—A letter from one of the officers gives the information that track-laying is now going on from Harrisburg, Tex., near Houston, to La Porte, on Trinity Bay, and will be completed in about four weeks. At the end of that time the line will be extended from La Porte south to Clear Creek, and probably to a connection with the North Galveston, Houston & Kansas City road at North Galveston. The company's charter has also been amended, so as to provide for an extension from La Porte northeast to Alexandria, La., and this construction will be taken up actively about January, the line being under survey at the present time. The stations between Harrisburg and La Porte will be: Allen's, Pasadena, Brighton, Deer Park and Richland.

Mexican Roads.—Work is being prosecuted on the Xuchil Railroad, a standard gauge line to extend from the Mexican Railroad, at the Esperanza Station, to Xuchil, situated at the base of the Orizaba Mountain. Of the total length of 13 miles about nine miles has been completed, and is in operation. The balance will be completed by the end of the year. The object of the

road is to open up great forests of oak and pine around the base of Orizaba Mountain.

Midland Terminal.—Telegraphic advice from H. Colbran, of the Colorado Midland, now in New York, confirms the previous statements that the company has arranged to construct the branch to Cripple Creek, Col. The branch will extend from Divide station, on the Colorado Midland, and will be 23 miles long. Eight miles has already been graded. Orders for rails have been placed with the Bessemer works in Pueblo. The line will be known as the Midland Terminal.

Middlesex Valley.—The company succeeded in making a crossing of the Northern Central tracks at Stanley, N. Y., this week without serious opposition, and it is now believed that the track-laying will be carried forward until all the work is completed to Geneva some time this fall. Naples is now the northern terminus of the road, but, as soon as it reaches Geneva, about eight miles northeast of that town, it will have connections with the Lehigh Valley and New York, Lake Erie & Western.

National City & Otay.—The company has just completed a little over a mile of new road, leaving the Sweetwater Branch at Cañon Junction, Cal., and running parallel to the Sweetwater River into the cañon quarry immediately below the Sweetwater dam. The rock thus made available will be used at once in building the government jetty now under construction at the entrance to San Diego Harbor. H. N. Savage, of National City, is Chief Engineer of the company.

New Roads.—A committee has been appointed by prominent planters and others in Avoyelles Parish, Louisiana, to try to secure the construction of a railroad through the towns of Evergreen, Cottonport, Moreauville and Fordelonville. The last-named place is 25 miles from the Texas & Pacific. The committee expects to secure free right of way and liberal subsidies and hopes to make some agreement with the Southern Pacific or Texas & Pacific to build and operate the branch. The chairman of the committee is V. F. Greenithon. L. L. Bordelon, of Long Bridge P. O., is one of the members.

McSweeney Bros.—McSweeney Bros., of Houston, Tex., who are constructing the 20-mile road from Sugarland to Duke and Arcola, Tex., which is to make connection with the Gulf, Colorado & Santa Fe and the International & Great Northern report that the road is all graded, and that the work on the bridges will soon be completed. Track-laying will be commenced this week. The road is being built for Cunningham & Miller, who own a sugar plantation at Sugarland.

Norfolk & Western.—A four-mile branch known as the Dwyer's Branch, from a point on the Ohio extension in West Virginia, has just been graded, and will be ready for operation in a few days. A further extension of about five miles is built to connect with the mines of the Pearl Coal Co.

North Bend & Kettle Creek.—A passenger train was run for the first time over this road on Sept. 29, when an inspection party, including President Blackwell and the directors, went over the line from North Bend to Cross Forks, in Potter County, Pa., about 12 miles north. An extension of the road about seven miles to coalfields near Kettle Creek is to be made at once.

Ohio Southern.—This road is building a ten-mile branch at Wellston, Jackson County, O., to connect with coal mines.

Powell's Mountain Mineral.—At Nashville, Oct. 7, this company was chartered to construct a line from near the mouth of Big Sycamore Creek, in Claiborne County, northeast through Hancock County to the Virginia state line, and through Lee and Scott counties, Virginia, to a point on the South Atlantic & Ohio road in Wise County. L. M. Jones and D. F. Bailey are the incorporators.

Revelstoke & Arrow Lake.—D. McGillivray, who has had many contracts on branch lines of the Canadian Pacific in British Columbia, has recently completed the clearing of the right of way for this branch from Revelstoke, B. C., south to Arrow Lake. The grading is to begin at once and in fact several hundred men have already commenced this work at the northern end of the line. The connection with the Canadian Pacific is made at Revelstoke and the route is then south to a point on Arrow Lake, about 28 miles. The building of this branch will give the Canadian Pacific a direct railroad line to the mining regions in the southern part of British Columbia. The Columbia River, the present outlet from the mining district to the Canadian Pacific line, is navigable only in the summer. A branch line called the Nakusp & Slocan, which is also controlled by the Canadian Pacific, is now building from the south end of Arrow Lake west to the Slocan mining district. It is proposed to operate a ferry transfer on Arrow Lake to connect these two branch roads.

South Florida.—The practical completion of the construction work on the Dunnellon extension is now announced by the officers of the company. The only further work on the line to be done this year is the building of about two miles of road near Archer, Fla., where the location has been delayed. An arrangement has been made to use the tracks of the Ambler branch of the Florida Central & Peninsular from Archer south about 15 miles. The work done this year consists of the grading and tracklaying from Juliette north 12 miles to the connection with the Ambler branch, and from High Springs south about 20 miles to near Archer. This extension really begins at Pemberton Ferry, but it was built from that point to Inverness in 1892. From Inverness to Juliette, the Silver Springs, Ocala & Gulf, now part of the Plant system, is used. North of Juliette the new construction work begins again, and then the junction is made with the Ambler branch. At High Springs connection is made with the Savannah, Florida & Western, and the extension, about 100 miles in all, was built to connect that road with the South Florida. T. L. Morton, of Sanford, Fla., has been constructing engineer.

South Shore (Canada).—Hon. Louis Tourville, Joel Leduc, J. M. Fortier and Hyacinthe Beauchemin, of Sorel, Que., are applying for an act of incorporation in Quebec under the above name to build a road from Levis, opposite Quebec, to Valleyfield, to connect with the Canada Atlantic. The line would pass through the counties of Levis, Lotbiniere, Nicolet, Yamaska, Richelieu, Vercheres, Chambley, Laprairie, Chateauguay and Beauharnois.

Tennessee & Eastern.—This line was chartered at Nashville last week. The company will build a standard

gauge road from Chattanooga northeast to Murphy. The route will be up the Tennessee River to Harrison, thence to Cleveland, on the East Tennessee, Virginia & Georgia, thence to Parksville, from which place it will follow the Ocoee River to Ducktown.

Texas Midland.—President E. H. R. Green, of this company, states that it has been decided to begin work immediately on the extension from Roberts northwest toward Paris, Tex. The present plan is to build about 40 miles of the line as soon as possible. Roberts is the present northern terminus of the road. Early in the year surveys were made over three routes between Roberts and Paris. Martin Duvall, of Terrell, Tex., is Chief Engineer.

Tobique Valley.—The government engineer has completed his final inspection, and the road is ready for traffic. The line connects with the Canadian Pacific at Perth, New Brunswick, and extends to Plaster Rock, a distance of 28 miles.

Washington & West Shore.—The work of construction on the Baltimore & Drum Point road is progressing rapidly. At the junction with the Annapolis, Washington & Baltimore, near Odenton, Md., the line was changed, necessitating a new grade for about 3,000 ft., mostly a heavy cut. The grading will be complete by Oct. 15, and it is expected that tracklaying will commence by Oct. 17 and be pressed continuously from that date. The work now under way is being done under the supervision of James H. McCreary, General Manager of the Washington & West Shore. The road will be operated under this name when it is completed to Drum Point. The office of the companies is in the Warden Building, Ninth and F streets, Washington, D. C.

Wilkes-Barre & Eastern.—The officers now announce that passenger trains will probably be running through to Wilkes-Barre, Pa., by Nov. 1. The track-laying is practically completed and all the large bridges, including the Panther Creek Viaduct, which is over 163 ft. high and 1,600 ft. long, have been erected. The road is 67 miles long, beginning at Stroudsburg, the terminus of the New York, Susquehanna & Western, and extending northwest to Wilkes-Barre. The road is built in the interest of the New York, Susquehanna & Western, and the principal traffic will be carrying coal from the mines of the Wilkes-Barre district to be transported to tidewater over the New York, Susquehanna & Western. W. P. Ryman, of Wilkes-Barre, is President of the company.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The comparative statement of operations for the month of August and two months of the fiscal year is given in the following table:

Month of August:	1893.	1892.	Inc. or dec.
Operated mileage.....	7,481	7,481	.....
Gross earnings.....	\$3,017,257	\$3,621,747	D. \$604,490
Oper. expenses.....	2,061,342	2,425,373	D. 421,131
Net earnings.....	\$1,016,015	\$1,196,374	D. \$180,359
Other receipts.....	75,000	75,000	.....
Total net earnings.....	\$1,091,015	\$1,271,374	D. \$180,359
One-twelfth annual fixed charges (est.)	942,000	919,000	I. 23,000
Surplus.....	\$149,015	\$352,374	D. \$203,359

The report of earnings for August and the first two months of the fiscal year for the entire system is given below:

Month of August:	9,344	9,344	.....
Operated mileage.....			
Gross earnings.....	\$3,663,872	\$4,524,048	D. \$860,176
Oper. expenses.....	2,430,855	2,939,715	D. 508,870
Net earnings.....	\$1,233,017	\$1,584,323	D. \$351,306
Other receipts.....	75,000	75,000	.....
Total net earnings.....	\$1,308,017	\$1,659,323	D. \$351,306
One-twelfth annual fixed charges (est.)	1,227,000	1,194,000	I. 33,000
Surplus.....	\$81,017	\$465,323	D. 384,306

Two months to Aug. 31: Average oper. mileage..... 9,345 9,345

Gross earnings..... \$7,391,544 \$8,512,094 D. \$1,120,550

Oper. expenses..... 5,028,866 5,660,419 D. 631,553

Net earnings..... \$2,362,678 \$2,851,675 D. \$518,997

Other receipts..... 150,000 150,000

Total net earnings..... \$2,512,678 \$3,031,675 D. \$518,997

Two months to Aug. 31: charges (est.)

Surplus..... 2,454,000 2,389,000 I. 66,000

Surplus..... \$58,678 \$613,675 D. \$584,997

Baltimore & Lehigh.—The bondholders' committee of the first mortgage bonds of the old company is taking steps to institute foreclosure proceedings. About \$850,000 of the bonds are outstanding, and on these the interest is due. The road is now operated by a receiver.

Central of Georgia.—Justice Jackson, of the United States Supreme Court, heard argument at Washington, D. C., this week, on a motion made by several bond and stockholders of the company, for the appointment of an additional receiver, to act with the present Receiver, H. M. Comer, of Savannah. R. S. Hayes, of New York, President of the New York & Northern road, has been appointed as additional Receiver.

Cleveland, Lorain & Wheeling.—By agreement the suit of the Lake Shore & Michigan Southern road to enjoin the consolidation of the above company and the Cleveland & Southwestern roads is to be heard at Cleveland, O., on Oct. 25. The Cleveland & Southwestern was organized early this year by stockholders of the Cleveland, Lorain & Wheeling to build a line into the city of Cleveland in the interest of the former company.

Illinois Central.—The earnings and expenses for August are given in the following table:

Aug.:	1893.	1892.	Inc.
Gross earn.....	\$1,908,856	\$1,591,017	\$317,839
Oper. expen.....	1,286,273	1,267,266	19,007
Net earn.....	\$622,583	\$323,751	\$298,832

Two months to Aug. 30: Gross earn..... \$3,608,592 \$3,040,583 \$568,069

Oper. expen..... 2,541,605 2,510,870 33,735

Net earn..... \$1,153,987 \$529,713 \$624,274

The eastside track lowering being carried out by this company in the city of Minneapolis is rapidly approaching completion. Nearly all the grading and masonry has been finished, and but three important bridges remain to be erected. They are Second, Fourth and Seventh streets, N. E., and the material is already

on the ground. The contractors, the Edge Moor Bridge Works, will this week begin the erection of these bridges.

Great Northern.—The financial statement of the system for the month of September and three months is shown in the following table:

September:	1893.	1892.	Inc. or dec.
St. P., M. & M. leased lines	\$1,380,430	\$1,13,807	D. \$33,377
Eastern of Minn.	149,770	125,607	I. 24,163
Montana Central.....	83,242	111,320	D. 28,078
Total for system.....	\$1,613,442	\$1,650,734	D. \$37,292

July 1 to Sept. 30:

St. P., M. & M. leased lines	\$3,425,370	\$3,369,495	I. \$55,875
Eastern of Minn.	386,861	359,296	I. 27,565
Montana Central.....	267,264	282,255	D. 14,991

Total for system.....

Sept. 1 to Sept. 30:

St. P., M. & M. leased lines	\$3,425,370	\$3,369,495	I. \$55,875
Eastern of Minn.	386,861	359,296	I. 27,565
Montana Central.....	267,264	282,255	D. 14,991

Total for system.....

Sept. 1 to Sept. 30:

St. P., M. & M. leased lines	\$3,425,370	\$3,369,495	I. \$55,875
Eastern of Minn.	386,861	359,296	I. 27,565
Montana Central.....	267,264	282,255	D. 14,991

Total for system.....

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